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Effect of Wet Finishing on Certain PHYSICAL PROPERTIES OF NYLON*

Presented by the NORTHERN NEW ENGLAND SECTION

Note: This paper was awarded Second Prize in the Intersectional Contest held during the Annual Meeting in Atlantic City, October 13, 1944.

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IT would indeed be surprising if the post war period did not produce a race for market supremacy within the textile industry—a race in which the wet finisher will find it vitally essential to utilize all the available information at his disposal relative to the physical properties of the textile materials with which he works. This will provide a background of fundamental knowledge to be drawn upon in the light of his practical experience.

Such knowledge will have wide application so that when the frequent predictions by the press, of astounding new products which will make their debut when peace is declared, come true, they will act as a stimulus for intelligent and even startling developments in textile products.

"The old order changeth yielding place to new." This was never more true than it is today! Not only does change apply to the materials, but to the technique of handling as well. Manufacturing and processing methods to a great extent will be dictated by unique properties exhibited by modified natural fibers such as cotton and wool and many of the modern artificial and synthetic fibers, notably nylon, which will be discussed here.

The term "wet finishing" basically connotes the application of moisture at various temperatures for controlled periods of time. Hence, this paper might well be entitled the effect of time and temperature of immersion on certain physical properties of nylon. Time and temperature of immersion have definite effect upon many fibers, yarns, and fabric properties, but neither time nor space permit a discussion of the effect of wet finishing on all. Therefore, a selection has been made for this presentation which is believed to include those of most pertinent general interest at this time.

STRENGTH AND ELONGATION
(Static Tensile)

At this point, it would be well to justify the terminology used in reference to types of loading, namely "static" and "impact." The conventional rate of movement of the pulling jaw of the tensile tester is 12 inches per minute as contrasted with 21 feet per second in the case of some types of impact testing. While it is recognized that any test which involves change of loading with time, is dynamic, for the purposes of this discussion the term "static" will be used where 12 inches per minute jaw speed is employed. Considering the relative speeds of 12 inches per minute and 21 feet per second (15,120 inches per minute), the slow speed is certainly of an order of magnitude which may relatively be considered static.

Skeins of 210 Denier nylon singles were prepared and immersed in water for each of the following times and at each of the following temperatures:

Time	*Temperature*
15 Seconds	35°F
45 Seconds	70°F
2 Minutes	120°F
5 Minutes	165°F
30 Minutes	212°F

The skeins were then conditioned for 48 hours. Ten specimens were drawn at random for each skein and the strength and elongation recorded.

Graphs I-2 through I-11 show the effect of time and temperature on the strength and elongation of the Nylon singles yarn.

At constant time: (Graphs I-2, 3, 4, 5, 6).

Strength: The immersion temperature seems to have little definite effect upon the strength properties although there appears to be a slight decrease in strength with an increase in immersion temperature.

Elongation: The immersion temperature has a definite effect upon the elongation properties. The plot of temperature vs. elongation at constant time apparently goes through a minimum at about 70° F. for immersion times of less than 5 minutes. As the temperature is increased above 70° F., the elongation increases. As the temperature decreases below 70° F. towards the freezing point of water, the elongation again increases. As time of immersion is lengthened, increases in elongation become more nearly lineally proportional to change in temperature.

At constant temperature: (Graphs I-7, 8, 9, 10, 11).

Strength: At constant temperature, the immersion time has little effect upon the strength properties.

Elongation: At constant temperature, as the time of immersion is increased, there apparently is a slight increase in elongation except at 35° F. where there seems to be a slight decrease in elongation.

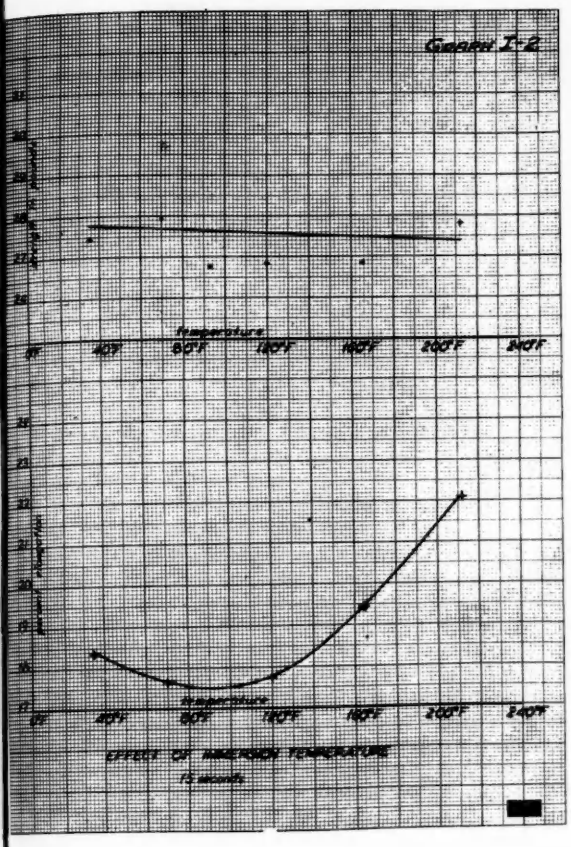
In the foregoing investigations, the use of Nylon singles eliminated the possibility of any major effect of twist upon changes in strength and elongation due to immersion at the various temperatures and times. (The producer's twist in the specimens employed was 1Z.)

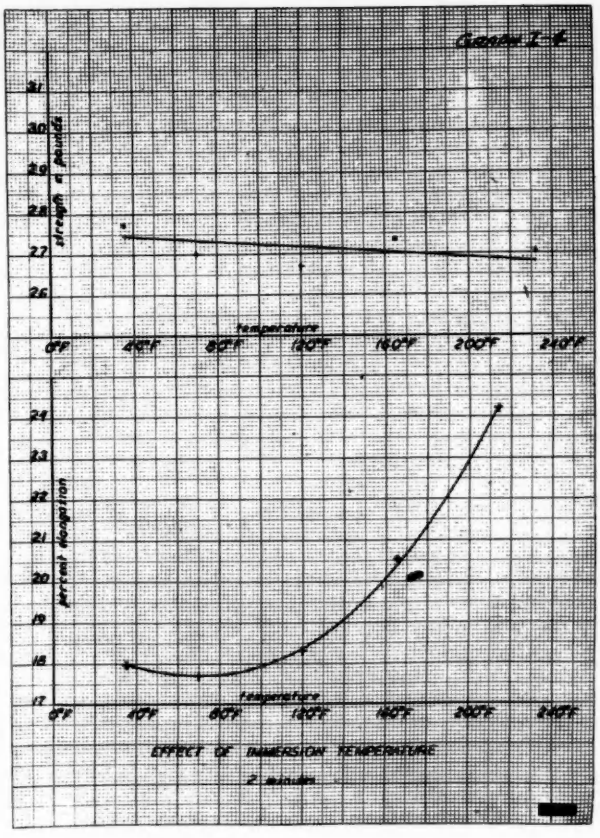
Nylon parachute shroud line sleeve

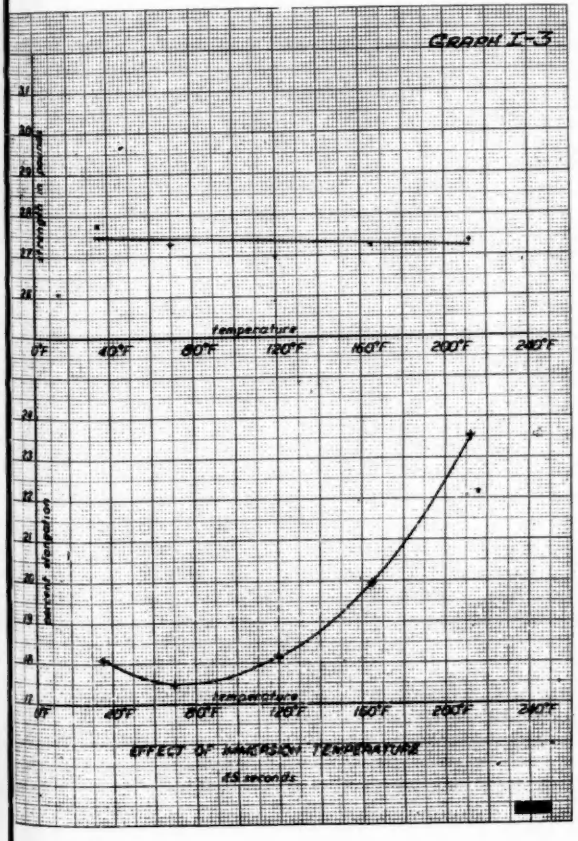
TABLE I—1
Effect of Immersion Time and Temperature on Strength and Elongation of Nylon Singles

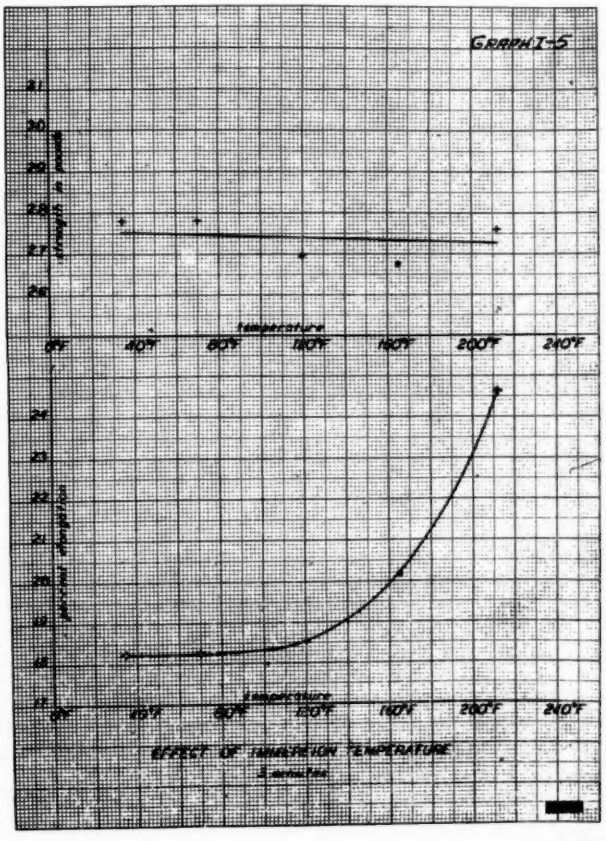
Strength (in Lbs.) *Temp./Time*	*15 Sec.*	*45 Sec.*	*2 Min.*	*5 Min.*	*30 Min.*
35°F	2.75	2.78	2.78	2.78	2.75
70°F	2.80	2.73	2.70	2.78	2.71
120°F	2.69	2.60	2.67	2.78	2.69
165°F	2.69	2.73	2.74	2.78	2.73
212°F	2.78	2.74	2.71	2.78	2.67
% Elongation					
35°F	18.35	18.13	17.96	18.25	18.00
70°F	17.62	17.46	17.73	18.25	18.05
120°F	17.70	18.19	18.31	18.51	18.56
165°F	19.46	19.95	20.57	20.69	21.83
212°F	23.08	23.58	24.19	24.68	24.00

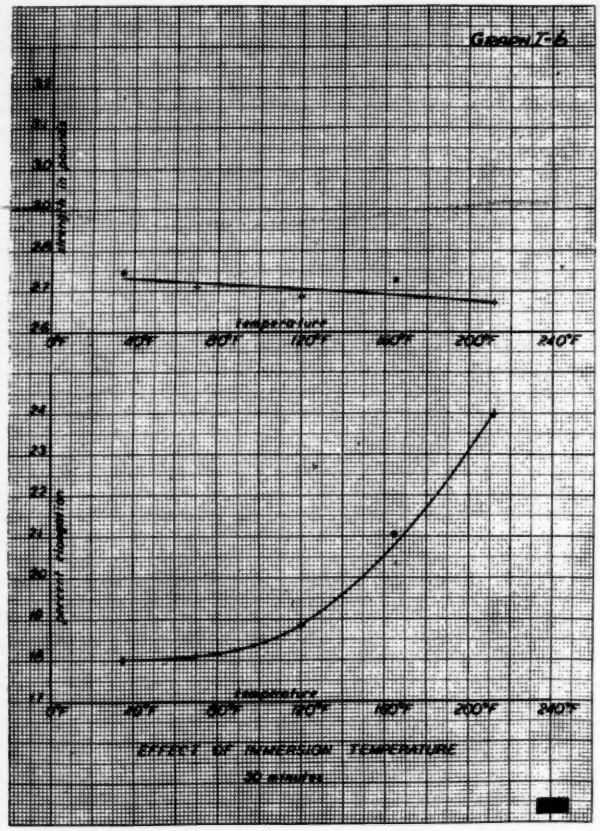
* Excerpts from a research program sponsored by Sauquoit Silk Co., Inc., Scranton, Pa.

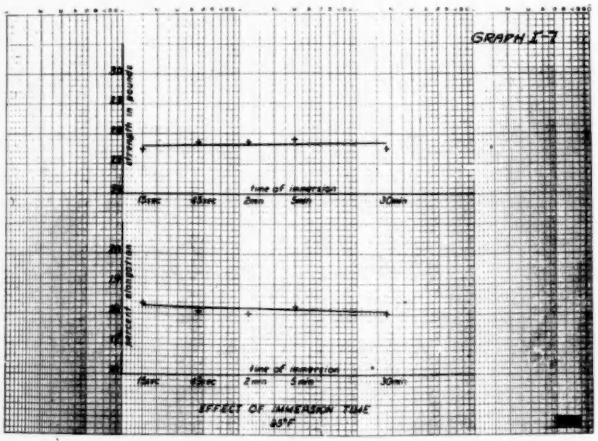

GRAPH I-2
temperature
EFFECT OF IMMERSION TEMPERATURE
15 seconds

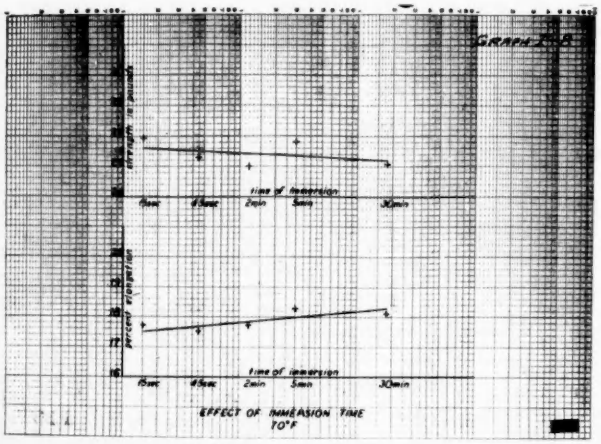

GRAPH I-4
temperature
EFFECT OF IMMERSION TEMPERATURE
2 minutes

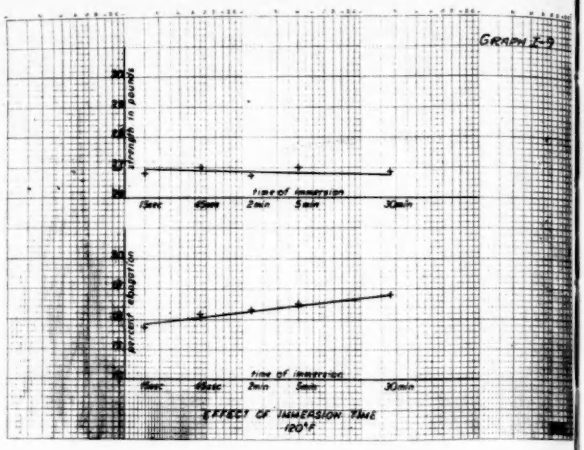

GRAPH I-3
temperature
EFFECT OF IMMERSION TEMPERATURE
45 seconds

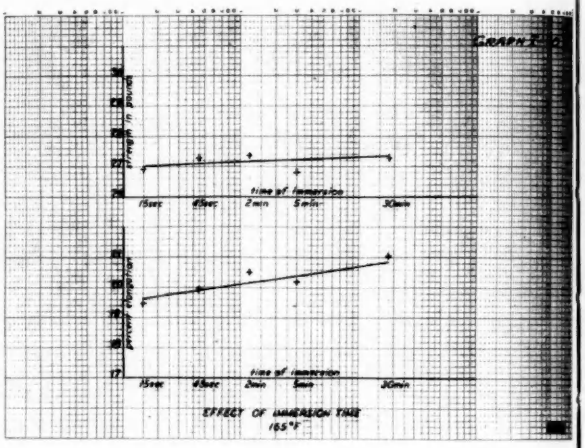

GRAPH I-5
temperature
EFFECT OF IMMERSION TEMPERATURE
5 minutes

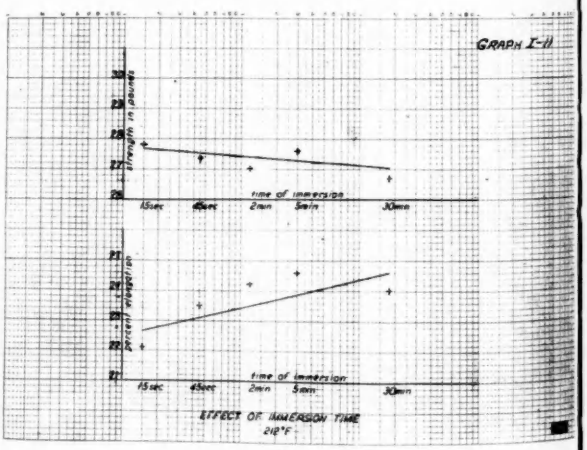






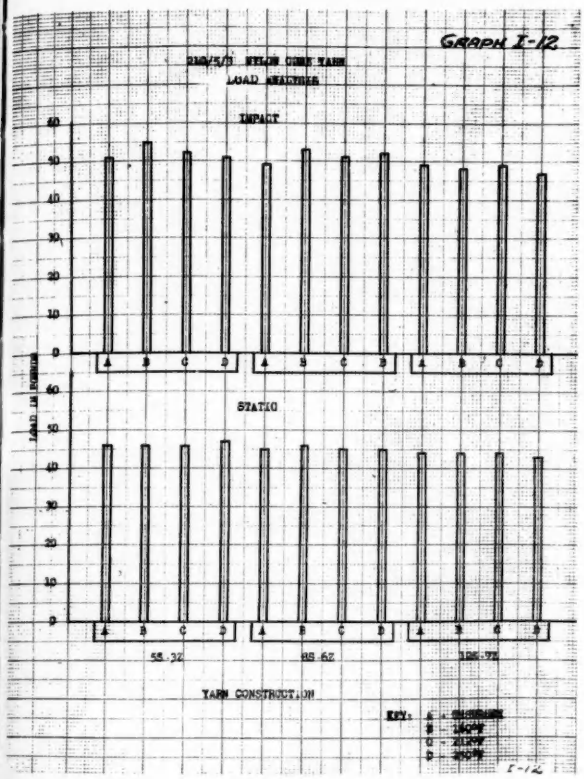


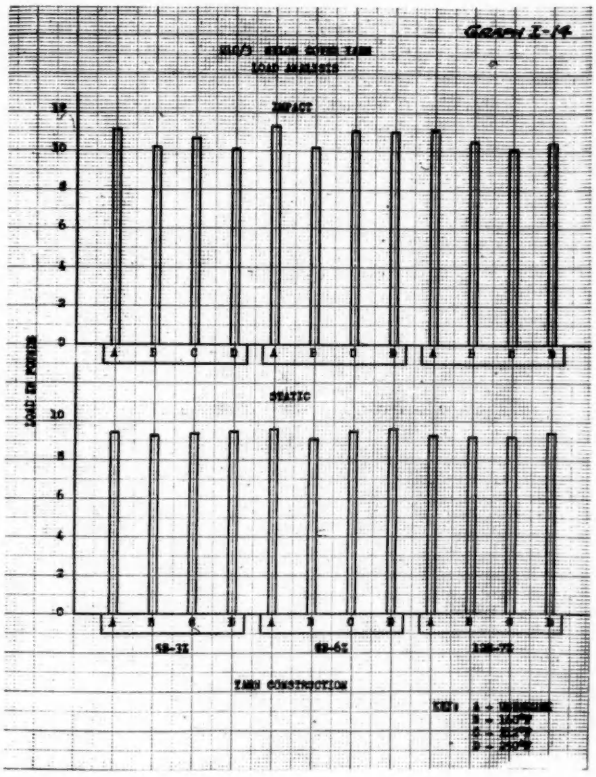


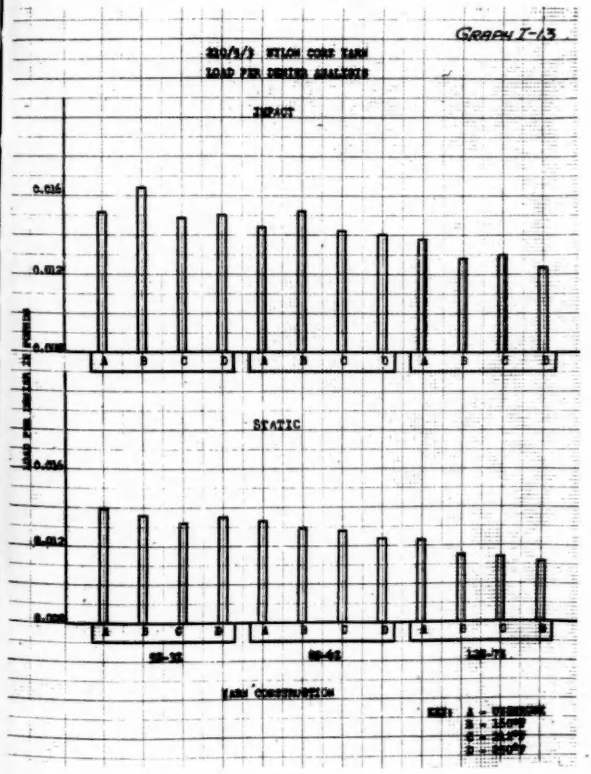


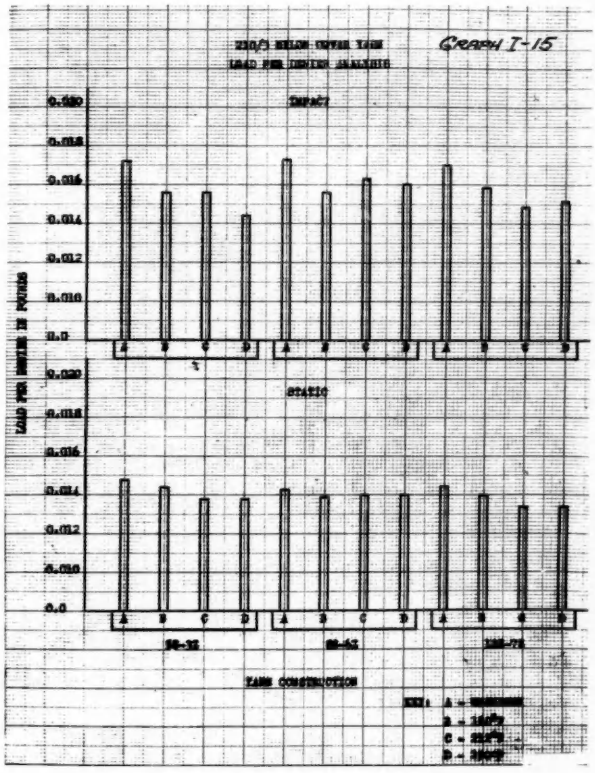
and core yarns were subjected to similar immersion procedure. The sleeve and core yarns were prepared in different balanced twist constructions giving the following schedule:

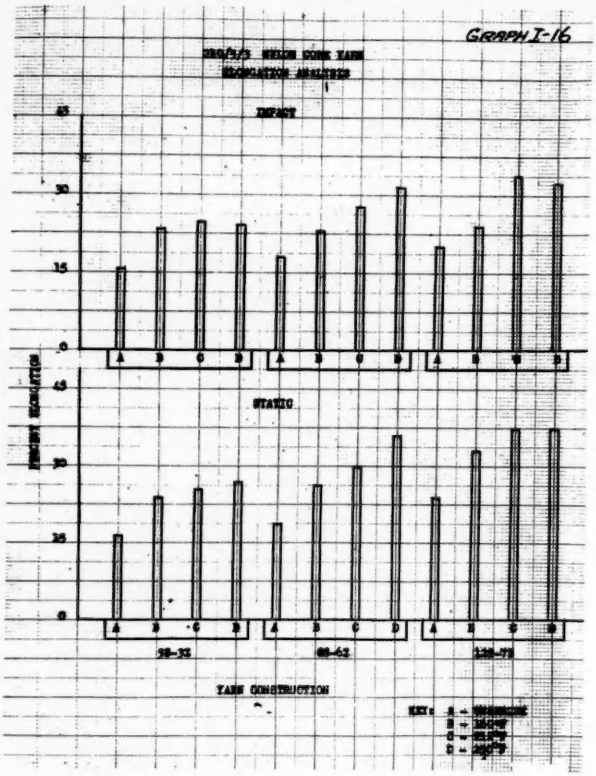
		210/5/3			210/3		
Unshrunk	... 12S-7Z	8S-6Z	5S-3Z	12S-7Z	8S-6Z	5S-3Z
160°F	..... "	"	"	"	"	"
212°F	..... "	"	"	"	"	"
250°F	..... "	"	"	"	"	"

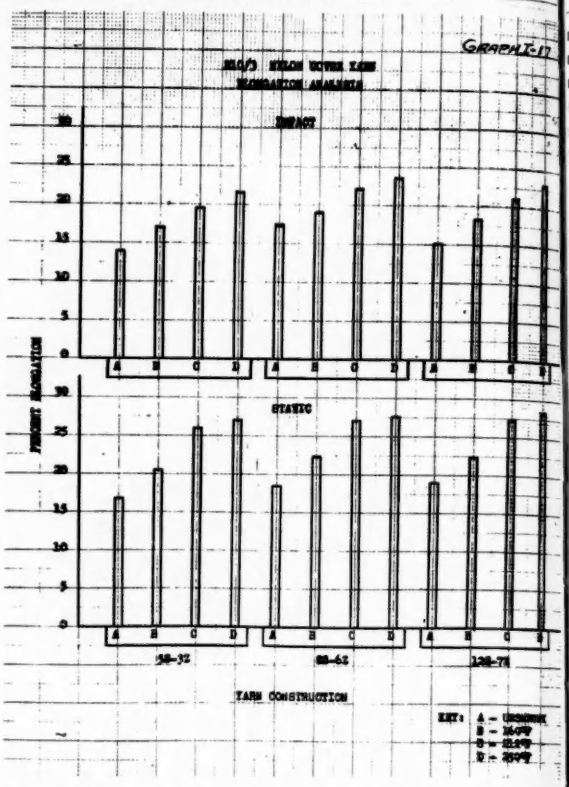

GRAPH I-12
IMPACT
STATIC
55-3Z
85-6Z
125-7Z
YARN CONSTRUCTION

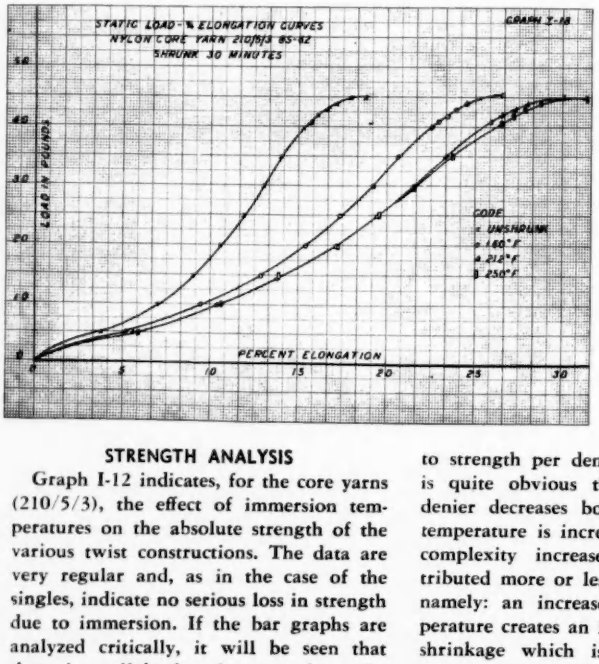

GRAPH I-14
IMPACT
STATIC
55-3Z
85-6Z
125-7Z
YARN CONSTRUCTION

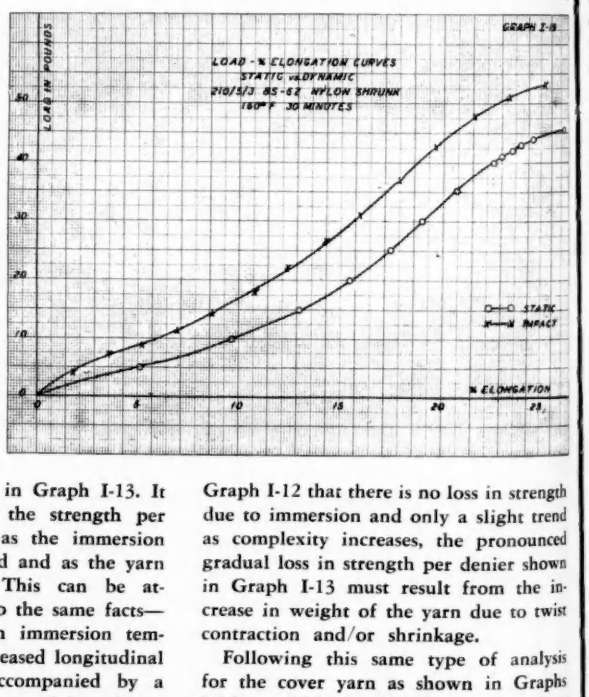

GRAPH I-13
IMPACT
STATIC
55-3Z
85-6Z
125-7Z
YARN CONSTRUCTION


GRAPH I-15
IMPACT
STATIC
55-3Z
85-6Z
125-7Z
YARN CONSTRUCTION









STRENGTH ANALYSIS

Graph I-12 indicates, for the core yarns (210/5/3), the effect of immersion temperatures on the absolute strength of the various twist constructions. The data are very regular and, as in the case of the singles, indicate no serious loss in strength due to immersion. If the bar graphs are analyzed critically, it will be seen that there is a slight loss in strength as the twist complexity increases—i.e.: the 12S-7Z yarns appear to have lower strengths than either the 8S-6Z or the 5S-3Z constructions.

The above results are also analyzed as to strength per denier in Graph I-13. It is quite obvious that the strength per denier decreases both as the immersion temperature is increased and as the yarn complexity increases. This can be attributed more or less to the same facts—namely: an increase in immersion temperature creates an increased longitudinal shrinkage which is accompanied by a greater cross sectional area giving rise to a gain in weight per unit length which naturally affects the denier proportionately. The increase in yarn complexity also contributes to this increase in denierage. Inasmuch as it has been shown in Graph I-12 that there is no loss in strength due to immersion and only a slight trend as complexity increases, the pronounced gradual loss in strength per denier shown in Graph I-13 must result from the increase in weight of the yarn due to twist contraction and/or shrinkage.

Following this same type of analysis for the cover yarn as shown in Graphs I-14 and I-15, it will be noted that there is no apparent change in strength for the various yarns.

As in Graph I-13, Graph I-15 shows a loss in strength per denier as the immersion temperature is increased. Comparing

these two graphs directly, it will be noted that the strength per denier is greater for the (210/3) cover yarn than for the (210/5/3) core yarn. This may be a very significant factor in the design of an end product made from such yarns.

ELONGATION ANALYSIS

Graphs I-16 and I-17 allow the analysis of the effect of various immersion temperatures on the elongation of the different cover and core yarns. It is obvious that the higher immersion temperatures are correlated with higher elongations. (See Graph I-18.)

It should be evident from the foregoing that the "degree" or extent of wet finishing of nylon textiles will have a decisive bearing upon the properties of the finished fabric.

A fabric woven from nylon yarns which have been carelessly wet processed might well be completely ruined by subsequent wet finishing. Consider, for example, a fabric which has been woven with filling yarns, some of which have received different treatments. By improper selection of finishing times and temperatures, various zones of the fabric may exhibit different properties. This may cause improper elongation balance between warp and filling yielding a product undesirable for many mechanical uses. This is especially true in the case of tentage, fabrics for plastic laminates, sail cloths, baggings, etc.

From the point of view of appearance, filling bands and the attendant loss in fabric value may also be traced to improper finishing. Dyeing defects, such as shading and bands, can in many instances be associated with improper handling as well.

STRENGTH, ELONGATION, AND ENERGY (Impact Tensile)*

The studies discussed in the foregoing sections have dealt with slow speed loading (12 inches per minute pulling jaw speed) but no consideration has been given the energy absorbing capacity or work absorbing power of the materials either under such rate of loading or under impact or "shock" loading.

Textiles are daily called upon to perform under shock loads both in their role in the war effort and in civilian use as well. An ordinary rip or tear in a garment fabric is usually the result of a suddenly applied load. The fabric is subjected to impact, and in such instances, knowledge of the behavior of the product from the point of view of energy absorbing capacity is vital.

Energy is work done and is the product of force times the distance through which it acts. Thus, it is important to know how the ultimate strengths and elongations of a textile material vary under "static" and impact conditions of loading, since ultimate strength represents the force and ultimate elongation, the distance through which it acts in rupturing the specimen. The area under the load-per cent elongation curve properly corrected for scale factors yields a value of energy expressed in In. Lbs./In. of gauge length.

STRENGTH ANALYSIS

Referring again to Graph I-12, the impact data for the core yarns, although slightly more variable than the static data, also show no serious loss in strength due to immersion. It can be seen from an overall point of view that the static results average about 45 pounds and impact data about 50 pounds. The impact data, although less uniform in characteristics, indicate the same conclusions stated for the static data. Comparing the static data directly with the impact data, it will be seen that the strength per denier is higher under impact than when tested statically. (See Graph I-19.)

Following the same type of analysis for cover yarns as shown in Graphs I-14 and I-15, it will be noted that, under impact conditions, the untreated yarns appear to be slightly stronger.

The ratio of impact strengths to static strengths is similar for the cover yarns and for the core yarns. The core yarns yielded a ratio of 50 pounds to 45 pounds or 10 to 9, and the cover yarns yielded a ratio of slightly more than 10 pounds under impact conditions to slightly better than 9 pounds when tested statically.

ELONGATION ANALYSIS

From Graphs I-16 and I-17, it is obvious that the greater elongations accompany higher immersion temperatures for the impact tests but it is also evident that the elongation values are lower for the impact tests than for the corresponding static tests. (See Graph I-19.)

ENERGY ANALYSIS

Graphs II-1, 2, 3, and 4 permit the study of immersion effects on the energy absorbing ability of the core and cover yarns of the various constructions when tested statically and under impact conditions.

From an overall point of view, the energy absorbing power of the core yarn as shown in Graph II-1 increases as the immersion temperature increases. The highest and lowest twists appear to gain very little in energy absorption by increasing the immersion temperature from 212° F. to 250° F. This is in contrast to the 8S-6Z construction which apparently benefits by the higher immersion temperature. Also, the ratio of the impact to static appears to favor the 8S-6Z construction. Worthy of note is the fact that the more complex yarns tend to have a higher energy absorption due primarily to the geometry of their structure. Graph II-2 indicates similar relationships on a denier basis to those shown in Graph II-1.

Graphs II-3 and II-4 indicate the absolute and per denier absorption of the cover yarns. The data in general are very regular and show that, for this lighter yarn, the energy absorbing power increases quite uniformly with the increase in immersion temperature. At no place in the range investigated does there apparently exist any noticeable tapering off of values. By and large, the effect of changing immersion temperature is more pronounced than changing the twist structure.

Summarizing, the following statements can be made relative to static and impact properties of nylon yarns studied in this investigation:

1—The impact strengths are higher than the static strengths by approximately 10 percent.

2—The impact elongations are always lower than the static elongations. The magnitude of the decrease varies considerably with yarn construction and immersion temperature.

3—The impact energy absorption is slightly higher than the static data.

4—Using immersion temperatures up to 250° F., the static or impact strengths are not adversely affected.

5—In both the static and impact results, there is a slight loss in strength as the twist increases.

6—The elongation increases in both the static and impact data as the immersion temperature increases.

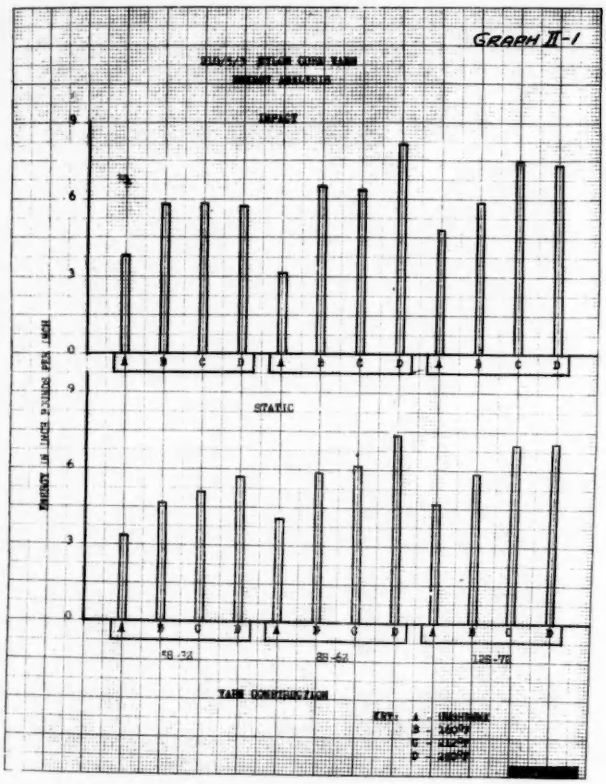
7—The energy-absorbing ability of the core yarns increases as the immersion temperature increases.

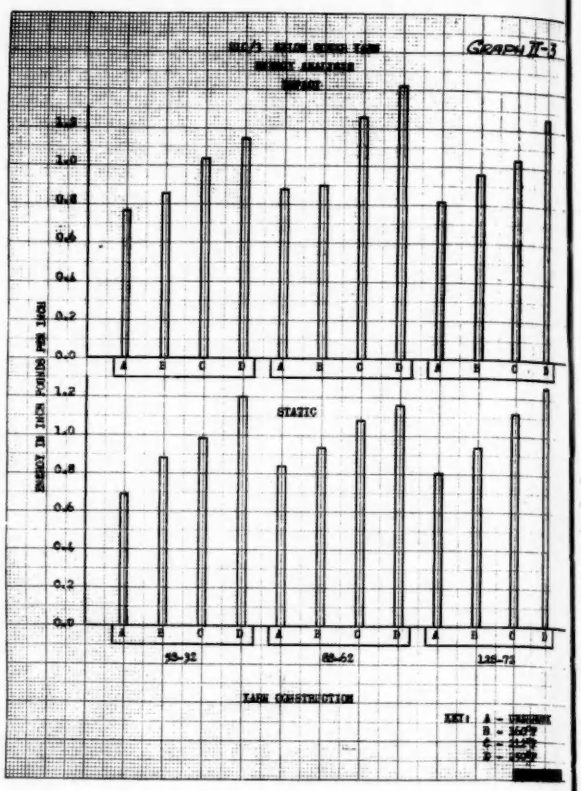
8—The energy absorbing power of the 8S-6Z core yarn benefits more than the 5S-3Z or 12S-7Z constructions when the immersion temperature is increased from 212° F. to 250° F. Also, the impact to static ratio of energies is more desirable at the 250° F. temperature for the 8S-6Z construction.

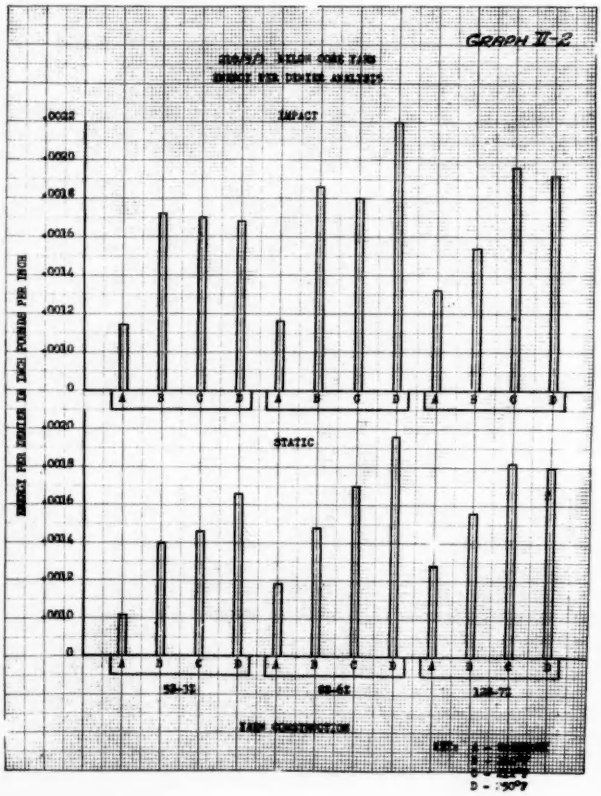
9—The energy absorbing power of the cover yarns increases with an increase in immersion temperature. Also, for these yarns tested, there is apparently no tapering off in energy as the higher temperatures are approached.

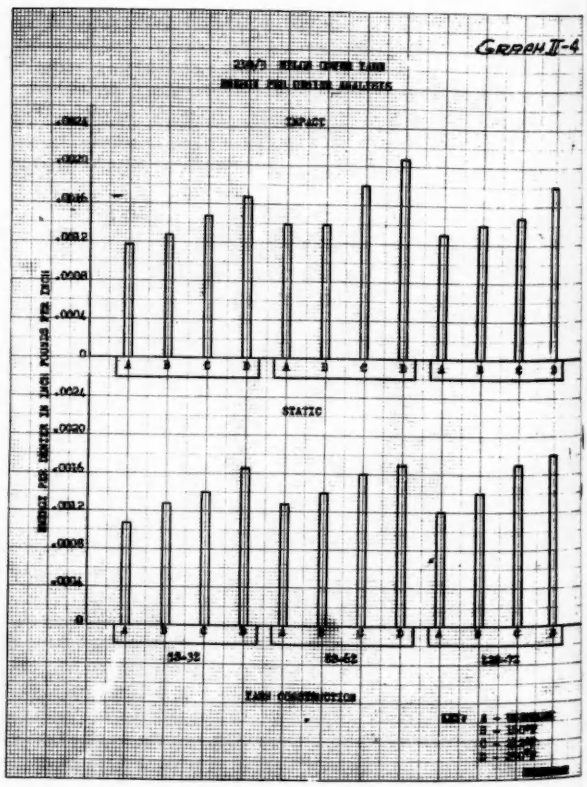
Consider for example a modern parachute used for live jumping. It is desirable to have a unit capable of absorbing at the correct rate, the kinetic energy of a falling man. The foregoing analysis has shown that the energy absorbing characteristics of nylon can be enhanced by proper selection of time and temperatures

* Impact Data courtesy of S. Slater & Son Research Fund Program, Massachusetts Institute of Technology—Textile Division.


GRAPH II-1
IMPACT
STATIC
YARN CONSTRUCTION


GRAPH II-3
IMPACT
STATIC
YARN CONSTRUCTION


GRAPH II-2
IMPACT
STATIC
YARN CONSTRUCTION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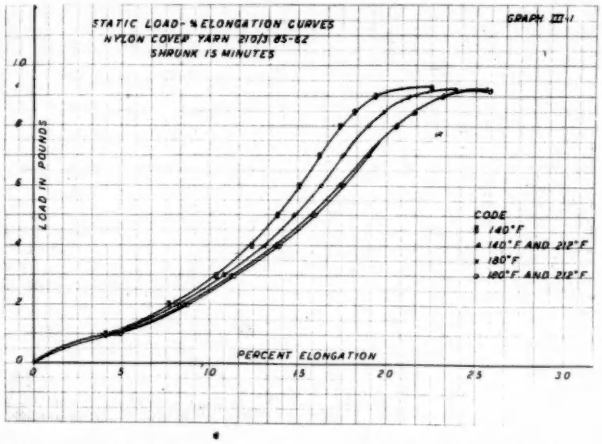
IMPACT
STATIC
YARN CONSTRUCTION



during wet finishing. An intelligent use of these factors can result in a structure allowing a minimum shock imposed on the man when the parachute opens and also a maximum guarantee of his safe descent.

Fabric-reenforced plastic laminates are playing an ever increasing part in the field of structural members. Proper design of such reenforcing fabrics requires a very careful consideration of wet finishing techniques in the light of their effect upon the energy absorbing power of the finished product.

MEMORY

Nylon possesses an unusual ability to return to its previous physical condition after having been subjected to distortion by mechanical or physical chemical treatment. This property which may best be termed "Memory" may be of great benefit in wet finishing, if properly understood and utilized, or it may prove highly detrimental if ignored or improperly accounted for.

Fortunately nylon can be made to "forget" as well as "remember"—and an intelligent application of combinations of memory and forgetfulness or obliteration is of vital importance in assuring a stable end product.

The following data indicate clearly these phenomena. Samples of 210 Denier nylon yarn were subjected to immersion at various temperatures for various times in accordance with the following schedule:

Date of Test	*Sample Treatment*	*Strength*	*Percent Elongation*
11/15/42	Removed from pirn	2.75 lbs.	12.0%
2/20/43	1 hr., 15 min. steam (20.5 lbs.)	2.69	22.5
8/16/43	After 6 mo. at 70° F-65% R. H.	2.67	22.1
8/20/43	Soaked 30 min. at 185°F.	2.75	21.1
8/20/43	Soaked 60 min. at 185°F.	2.79	23.1
8/20/43	Soaked 2 hrs. at 185°F.	2.81	22.8

All tests were made on samples selected at random from a skein taken from the pirn before the tests were made 11/15/42. Samples were conditioned at 70° F.-65 per cent R.H. for a minimum of 72 hours after removal from the pirn, after the steam treatment, and after the soaking treatments, before tests for strength and percent elongation indicated above were made.

From the above data, it appears that, after nylon has been steamed, subsequent heat treatments below the boil do not affect significantly either the strength or the percent elongation. There appears to be a slight upward trend, but the difference is so slight as to be well within the variability of the material.

Thus, these samples "remembered" their previous treatment six months after it had been applied.

Frequently, it is desirable to obliterate the effects of past treatment or essentially cause the material to "forget" what was previously done to it. The following data indicate how successfully such a result can be obtained.

Two skeins of 210/3-8S-6Z nylon parachute sleeve yarn were respectively subjected to immersion in water at 140° F. and 180° F. for 15 minutes. They were subsequently conditioned at 70° F.-65 per cent R.H. for 72 hours and then tested for strength and elongation. Graph III-1 shows composite load-percent elongation curves representing ten tests on each sample. As before, the strength remains essentially unchanged but the percent elongation shows a significant increase, the 180° sample having the greater ultimate elongation.

The two skeins were then *both* immersed in water at 212° F. for 15 minutes, again conditioned at 70° F.-65 per cent R.H. for 72 hours and tested. Reference to Graph III-1 indicates that the 212° F. treatment completely obliterated the effect of the previous treatment, the final strength and elongation properties of the two original samples now being substantially identical.

Thus, by a proper chronological selection of wet treatments, the specimens were made to "forget" their previous treatments and "remember" a new one.

RESILIENCE AND COMPRESSIBILITY

In order to determine the effect of wet finishing upon the resilience and compressibility of nylon fabric, a sample of knitted nylon fleece was divided into two parts, one of which was left untreated as a control, the other was subjected to steam at 250° F. for 15 minutes.

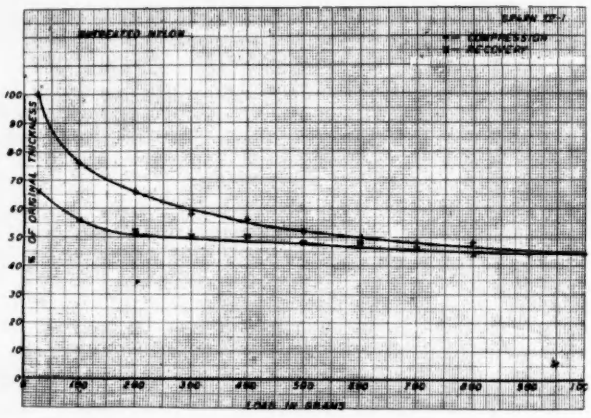
Both samples were brought to atmospheric equilibrium with the standard textile testing atmosphere of 70° F. and 65 percent R.H. Each sample was then submitted to the following compression cycle of loading and unloading.

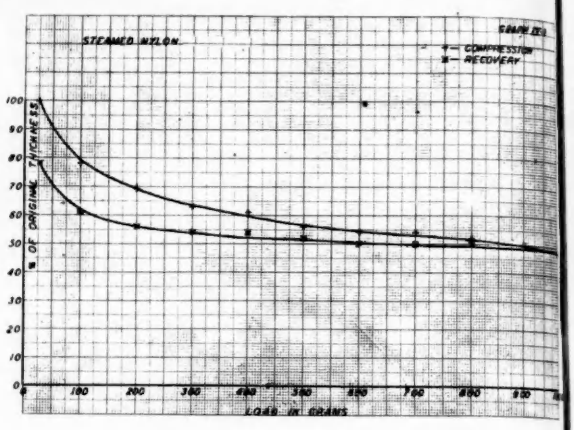
After the thickness of the sample had been measured at substantially no load, the samples were compressed at a constant rate of load of 100 grams per minute to an ultimate load of 1,000 grams and then the load was released at the same rate as the compression loading.

Thicknesses were read at the corresponding increments of load, giving data which enabled the plotting of a type of diagram as indicated in Graph IV-1 and IV-2. As the thickness varied for different portions of the samples it was considered desirable to plot percent thickness on the basis of the original thickness versus load rather than actual thickness, as the former would yield a more quantitative comparison between samples of different thicknesses.

Data	*UNTREATED*		*TREATED*	
Run	*Percent Original Thickness Max. Load*	*Min. Load*	*Percent Original Thickness Max. Load*	*Min. Load*
1	44.4	66.6	47.8	78.2
2	46.7	73.3	52.4	78.6
2 (2nd Cycle)	46.7	71.1	50.0	76.2
3	43.8	68.8	43.5	71.7
3 (2nd Cycle)	41.7	62.5	43.5	67.4

There are several methods that may be employed in evaluating the characteristics of a compression curve as shown in this study, the first of which is known as the "Energy Concept." If the area under the compression curve is taken to depict the energy expended in compressing the sample, it follows then that the area under the decompression curve represents the energy given back to the machine by the sample on the release of the load. The difference between these two





areas represents lost energy and is inversely proportional to the resilience properties of the material under test. That is, the higher the lost work, the less the resilience. If the decompression curve were super-imposed on the compression curve, there would be no lost work and the sample would be 100 percent resilient or conversely, if there were no recovery of thickness on the release of the load, the lost work would equal the energy expended in compressing the sample and it would have no resilience whatever.

A second method of interpretation is to measure the linear displacement at the maximum load which in these curves would be represented by the percent thickness at 1,000 grams. In this instance, a greater percent thickness would represent a more resilient sample.

A third criterion that may be employed is the percent thickness at minimum load, which, in this instance, would be represented by the percent thickness at 25.4 grams on the decompression curve. In this instance, a greater percent thickness would represent a more resilient sample.

All of these measurements are not necessarily correlated with the resilience properties of every material that is tested but emphasis should be placed upon the measurement which depicts the type of service which the material will experience in use.

From the curves and the data, it is evident that the treated specimens manifest less lost energy, a greater thickness under maximum load, and a greater recovery from maximum to minimum load.

Thus the treated material exhibits superior compression resistance and recovery or resilience properties.

From a practical point of view, wet finishing can play an important part in the production of pile fabrics such as upholstery materials, rugs, etc., and also velvets and fleeces for wearing apparel. Adequate final wet processing will do much to prevent distortion from constant use thereby greatly enhancing the utilitarian value of the final product.

ABRASION RESISTANCE

Investigation of the effect of wet finishing upon the abrasive resistance of 60 Denier nylon singles yarn (producer's twist 1Z) indicated a significantly greater resistance to abrasion in the case of the sample which was subjected to the treatment as compared with the untreated control.

The treated yarn was subjected to steam at 250° F. for 30 minutes. It was then conditioned at 70° F.-65 percent R.H. for 72 hours in skein form, subsequent to which it was transferred to a spool from which it was wound under 25 grams tension, 144 yarns per inch onto a special seriplane panel. The untreated yarn was wound directly from the cone to the seriplane panel under the same tension and with the same yarn spacing. (Previous work indicates there is no significant difference in physical properties of yarn wound from a cone or spool during the preparation of the seriplane panel.)

The treated and untreated yarns were abraded on the Taber Abrasion tester, portable model—Type J. F., using the CS-15 wheels and 500 gram head for 100, 200, 300, 400, 500, 750 and 1,000 cycles.

Test samples were broken (serigraph method), using a one inch gauge length in pendulum type Suter testers equipped with autographic recorders having capacities of 50, 100 and 300 pounds, jaw speed was 12 inches per minute.

Data (Each value is the average of 10 tests)

Cycles	*UNTREATED*		*TREATED*	
	Breaking Strength	*% Loss*	*Breaking Strength*	*% Loss*
0	106.2	—	107.2	—
100	80.5	24.2	84.7	21.0
200	62.7	41.0	72.4	32.5
300	62.3	41.4	66.3	38.1
400	55.3	48.0	59.4	44.6
500	49.2	53.7	49.5	53.9
750	35.2	66.9	38.1	64.5
1000	22.2	79.1	32.3	69.9

STATISTICAL ANALYSIS

Percent Coefficient of Variation For Breaking Strengths

Cycles	*Untreated*	*Treated*
0	0.6	1.4
100	4.5	2.9
200	17.8	3.2
300	3.2	4.2
400	4.6	4.7
500	5.8	3.9
750	7.9	10.9
1000	24.5	9.5

"T" TEST

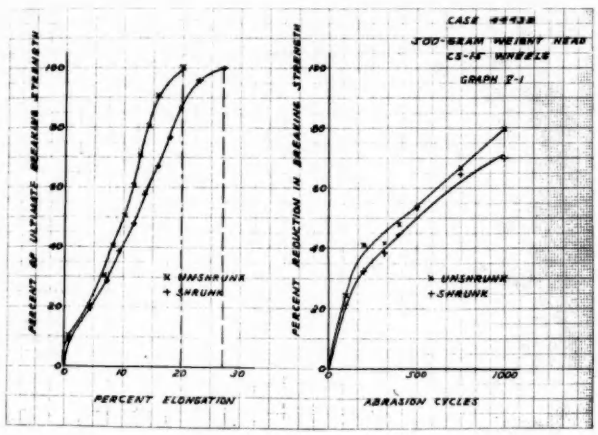
The "T" test indicates differences between the means of two samples. The five per cent significance level with 18 degrees of freedom is 2.101. Values above this level indicate significant differences in resistance to abrasion.

Cycles	*"T" Values*	*Significantly Greater Resistance*
100	2.446	Treated
200	2.510	Treated
300	3.274	Treated
400	2.959	Treated
500	0.197	Neither
750	1.623	Neither
1000	4.968	Treated

From the foregoing, the following conclusions can be drawn:

The 60 Denier nylon singles manifest a greater resistance to abrasion after being subjected to the steam treatment. The variability of the material after treatment is reduced.

Graph V-1 indicates the load elongation characteristics of the yarns and the rate of reduction in strength, due to abrasion, with cycles. It will be noted from the load elongation graph that the area under the treated (shrunk) curve is greater than that under the untreated (unshrunk) evi-



dencing greater energy absorbing capacity. Thus, it appears that abrasive resistance is correlated with energy absorbing power and elongation and can be modified by wet finishing techniques. This apparent correlation has been evidenced in extensive research conducted on nylon and many other fibers.

REGAIN (Conditioned from Dry Side)

All percent moisture calculations are quoted on a per cent *regain* basis.

$$\text{Percent Regain} = \frac{\text{Original conditioned weight} - \text{bone dry weight}}{\text{Bone dry weight}} \times 100$$

Twenty-five gram samples of 210 Denier nylon singles from several pirns were conditioned for 36 hours at 70° F.-65 percent R.H., accurately weighed, placed in an Emerson conditioning oven and bone dried at 230° F. The loss in weight was recorded at different time intervals until equilibrium was attained. The percent regain at bone dryness was calculated.

The percent regain loss from conditioned weight is 3.5 percent (average of 5 determinations). The bone dried sample described above was quickly transferred to an analytical balance the conditions of which were 70° F.-65 percent R.H. The increase in weight was recorded with time until conditioned equilibrium was attained. The percent regain on attaining equilibrium from the bone dry conditions was calculated.

When nylon is conditioned from the dry side to 70° F.-65 percent R.H. it has a moisture regain of 3.5 percent (average).

From the above it is apparent that the bone drying of nylon does not effect its ultimate regain properties.

REGAIN (Conditioned from Wet Side)

Several samples of 210 Denier nylon singles, in the form of skeins, were conditioned at 70° F.-65 percent R.H. and weighed accurately. These skeins were then soaked in water either at 70° F. or 212° F. for 30 minutes, after which they were allowed to drip dry and recondition at 70° F.-65 percent R.H. Weighings were made at intervals until equilibrium was reached; and then, the samples were bone dried at 212° F. in the Emerson oven.

The percent regain was calculated. These samples were allowed to recondition a second time, bone dried again, and allowed to recondition a third time.

Percent Regain

After Wetting	*After 1st Drying*	*After 2nd Drying*
70° F—30 Minutes		
4.65		
4.47		
4.04	3.92	
4.49		
4.76	3.80	3.82
4.50	3.99	3.91
212° F—30 Minutes		
After Wetting	*After 1st Drying*	*After 2nd Drying*
3.84	3.94	
4.64	4.12	4.13
4.48	4.20	3.89
4.10		

From the above table it is seen that the ultimate regain of a sample of nylon at 70° F. and 65 percent R.H. can be *increased* by previously wetting out in water. After reconditioning and then bone drying, the regain is *less* than the regain *after soaking;* but *greater* than the sample which was *merely bone dried.*

The percent regain after a *second* bone drying is *approximately the same* as the per cent regain after the *first* bone drying.

Summarizing, when nylon is wet out and reconditioned at 70° F.-65 percent R.H., its regain is increased. If it is then bone dried and allowed to recondition, its regain is less than that which it had when allowed to recondition from the wet side; but it is higher than if it had not been previously wet out. On ensuing repeated bone dryings, the regain remains essentially constant, but at a value higher than its normal regain at 70° F.-65 per cent R.H.

For a range of immersion temperatures from 37° to 212° F. and immersion times up to 30 minutes, the increase in regain is independent of time and temperature of immersion.

It should be evident that this increase in final regain resulting from wet finishing should be carefully considered when projecting the finished weight of yarns or fabrics. The increase amounts to as much as 28.5 percent of the normal regain and depending upon the weight of the finished product, such an increase may assume important proportions.

DYEING PROPERTIES

A piece of greige nylon poncho fabric was cut into two sections. One portion was placed in the autoclave and subjected to 20 lbs. steam pressure (260° F.) for 15 minutes. Both fabrics were then allowed to condition at 65 percent R.H.-70° F. for 72 hours.

Exactly 4-gram samples of each were weighed out and dyed according to the following schedule. In each case, the untreated and steamed portions were dyed together in the same dyebath.

Milling Yellow 6G	3%
Alizarine Red RB	1%
Alizarine Blue CL	3%
Alizarine Blue CL	2%

Dyeing was carried out in the conventional manner.

Keeping in mind the "Memory" of nylon, care was taken not to again approach the 260° F. temperature of steaming; for if such were the case, the differential between the steamed and unsteamed nylon would have been diminished. To that end, the dyebath temperature was not allowed to go higher than 180° F., the optimum temperature for the particular dyestuff's chosen.

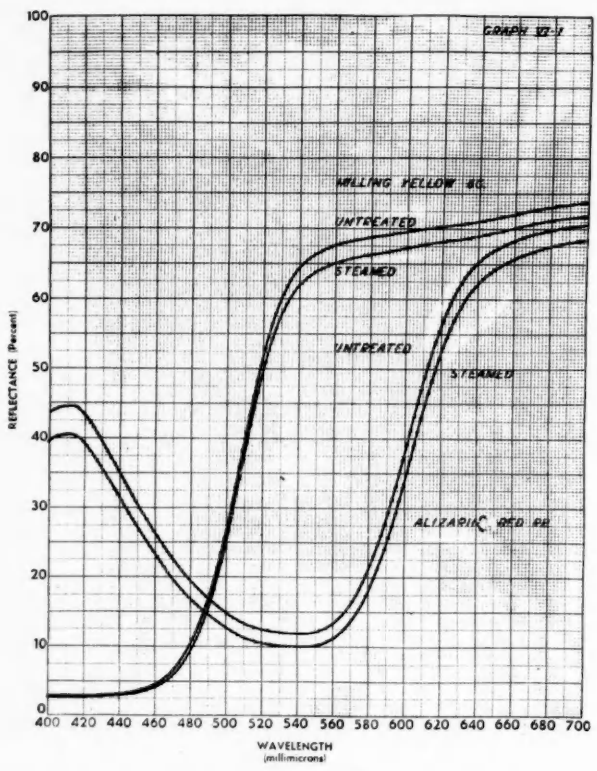
The samples were allowed to air dry.

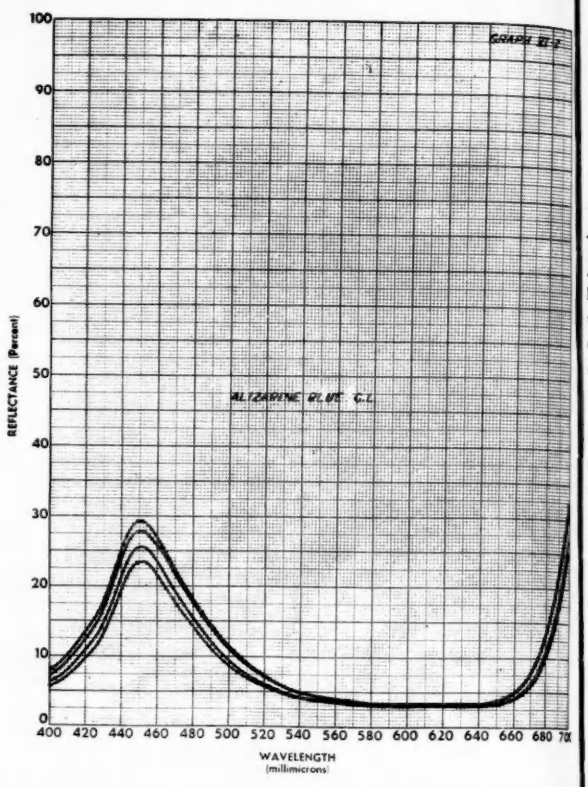
Visual examination in every case showed the steamed nylon to dye a deeper shade.

Graphs VI-1 and VI-2 are spectrophotometric curves of these colors, plotting Per Cent Reflectance vs. Wavelength. In the case of the Milling Yellow and Alizarine Red, the steamed samples both show less reflectance and, hence, are deeper shades (Graph VI-1). The upper set of curves in Graph III-2 is the 2 percent Alizarine Blue. The lower set is 3 percent. In both cases, the lower curve of each set is that of the steamed nylon, again showing deeper shades.

Thus, it is seen that independent of the care and precision in dyeing of nylon, the previous history of the material before it reaches the dyehouse must be taken into account if streaks, bands, and the like are to be eliminated.

This may be accomplished by several





methods: (1)—All wet treatments of yarns and fabric prior to dyeing may be controlled to insure uniformity; (2)—The dyeing may be carried out at a temperature higher than was experienced in any previous treatment; (3)—Before dyeing, the material may be immersed in water or be steamed at a temperature higher than any previous treatment.

The effect of wet finishing on nylon has been discussed in the foregoing sections as it applies to certain physical properties—namely: Strength, Elongation, Energy, Absorption, Compression and Resilience, Abrasion Resistance, Regain, and Dyeing Properties. Study of the effects of immersion on other physical properties has indicated results of equal interest to those discussed in this paper.

The finisher, after all is said and done, has no product or commodity to sell; he sells consumer satisfaction and that satisfaction will be governed by his knowledge of new fiber properties to an ever increasing extent in the immediate future and in the years that lie ahead.

MEMBERSHIP APPLICATIONS

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(Continued on Page P158)

The Level Dyeing of Damaged Wool in RAW STOCK DYEING*

JOHN O'DAY
Nyanza Color & Chemical Co.

IN tying in three important phases of wool dyeing in one paper, namely, the level dyeing of pulled wools, mildewed wools and fine wools damaged as a result of sunlight, volumes of each have been and still may be written, I wish to say it came about as follows:

Some time ago, I was called to a woolen mill where they were making a medium grade covert cloth. The superintendent of dyeing showed me a sample of this fabric which contained white wool specks all through the piece and also pointed out to me the unevenness of the colored yarn, which reflected in the cloth as light and dark streaks. He stated that this fabric was made up of—

55%—Good grade dyed shoddy
30%—56/s South American dyed pulled wool
15%—60/s Australian dyed wool.

The superintendent also stated that they had planned to make a high grade covert and automotive fabric with the 60/s Australian wool, but their samples were really poor.

The writer submitted samples of the pulled wool and damaged 60/s Australian wool to the members of the Association and their guests for their inspection. We were informed that the following colors had given them the best results to date.

For 56/s pulled wool:	*Index No.*
Alizarine Cyanine Green CG Extra	1078
Anthranol Chromate Red ECB Extra	652
Anthranol Chromate Brown EBS Conc.	Prototype 14
Alizarine Blue Black B	1085
Nutrachrome Yellow NYA	219
Milling Blue 5R Extra	289
Alizarine Grey LL	206
For 60/s Australian Wool	*Index No.*
Anthranol Chrome Red ECB Extra	652
Nutrachrome Yellow BWC	
Alizarine Blue Black B	1085
Anthranol Chrome Brown B	Prototype 2
Nutrachrome Blue Black 2BX	
Nutrachrome Brown 3GL	
Alizarine Grey LL	206

On examining the various dyed stocks, we found that the shoddy was not at fault, but the 60/s Australian was dyed extremely uneven and the 56/s South American pulled wool was equally uneven and in addition, the tips were not dyed. On further examination in the card room, it was found that the tips of the pulled wool did not open up and consequently, showed up as white specks in the finished piece. This mill's dyeing equipment consisted of wooden hand tubs, Hussong Dyeing Machines with stainless steel cages and stainless steel pressure dyeing machines. The water used was soft. Neither wools had been carbonized, but both wools had been given a rinse in the last scouring bowl with formic acid so that the wools as received at the dyehouse had a pH of 4.5. We might also add that they had dyed these same wools, which had a pH of 8.2 when received at the dyehouse, with the same poor result.

It was also ascertained that in trying to overcome their problem, they had made quite a few changes in dyestuffs and had tried Chrome Bottom, Metachrome and Top Chrome methods; also, they had tried various methods of prescouring and pre-treating of the stock with about the same negative result.

We secured samples of the 56/s South American pulled wool and 60/s Australian wool and on subsequent examination, we found that the pulled wool had not been thoroughly cleansed after pulling—in other words it had a very high lime content and the tips were particularly bad, showing under the microscope that the fibers were bound or cemented together by the lime. On testing the 60/s Australian wool, we found that it had been damaged by mildew. We also found parts of the 60/s Australian wool that showed no damage by mildew, but which dyed very tippy. This was due to sunlight damage. I might add at this point, and I will put it briefly that—

A. Mildewed wools are wools that have been attacked by low forms of vegetable life, leading to their disintegration and decay and which, from the dyer's point of view, dye very unevenly. (Aspergillus, Mucor, and Pennicillium).

B. Sunlight damaged wools are wools that have been exposed to the sun's rays for a prolonged period while on the sheep's back.

C. Pulled wool is a term applied to wool that has been removed from the pelts of animals, slaughtered largely in the packing houses. There are two main processes for doing this operation. First, in the lime process, the skins are painted on the flesh side with slacked lime, then left overnight. The next morning, the skins are given a cleansing to remove the lime and then sent to the pulling room. The other method is the depilatory process wherein the skins are painted on the flesh side with a depilatory solution, composed of water, sodium sulfide and lime.

I think it is of interest to know that in 1938, 65 million pounds of pulled wool were produced against 364 million pounds of sheared wool, or about 15 per cent of the annual domestic production, which is quite an item.

And, now for the problem. We *first* tested a large number of dyestuffs by the Chrome Bottom, Metachrome and Top Chrome methods and through the process of elimination, found the following colors to be the most suitable:

Colors for pulled wool	*Index No.*
Anthranol Chrome Red GL Conc.	300
Nutrachrome Blue Black G	Pr. 299
Anthranol Chrome Yellow FTL (No Prototype, new color manufactured by Nyanza Color & Chemical Co.)	
Chrome Fast Brown GDR	204
Anthranol Chrome Yellow SWA	197
Alizarine Cyanine Green SG Extra	1078
Anthranol Chromate Red ECB Ex.	652
Colors for 60/s Australian Wool	
Anthranol Chrome Red GL Conc.	300
Anthranol Chrome Yellow FTL (No Prototype)	
Chrome Fast Brown GDR	204
Nutrachrome Blue Black G	Pr. 99
Nutrachrome Blue 2RL	

All of these colors possess the highest fastness to light, fulling and carbonizing properties.

Second, we confirmed what is characteristic of all fine wools, i.e., when they are dyed in pressure dyeing machines they tend to pack, causing channeling of the stock and consequently, uneven dyeing. To overcome the packing, we added to the dyebath 4 per cent (on the weight of the stock) of a protective agent which is a degradation product of albumen and which, for the purpose of this paper, we will refer to as product "L."

* Presented at Fall Meeting, Mid-West Section, November 4, 1944.

Product "L," due to its colloidal nature, keeps the wool stock in an open, lofty condition, thereby preventing packing and channeling of the stock. Further, due to its extreme fastness to lime, it aids in the dispersion of the line.

Third, we examined the samples of the bottoms before chroming and found that by adding 1 to 2 per cent of formic acid, the amount depending on the depth of shade, fifteen minutes before adding the chrome, that the tips were perfectly dyed and the wool was very level. In this connection, we also found that if no addition of formic acid was made, the wool was slightly uneven and the tips, while appearing to be well dyed, would strip off white after adding the chrome. I might also mention that acetic and sulfuric acid did not give the same good result in this work when added before the chrome.

From the above observation, we evolved the following formula:

The wool is wetted out with 1 per cent sodium alkylnaphthalenesulfonate for 10 minutes at 135 deg. Fahr., and for the purpose of this paper, this product will be referred to as Product "TX." The bath is then cooled back to about 80° Fahr. Then add 4 per cent of Product "L," work through the stock for 10 minutes, then add the Glauber's salt, the correct dyestuffs (well dissolved) and run for 10 minutes. Then add 3 to 5 per cent acetic acid 56 per cent, depending on the depth of shade. Run 10 minutes, raise to the boil in 45 minutes, boil 40 minutes and shut off steam. Add 1-2 per cent formic acid, well diluted. Raise to the boil, boil 15 minutes, shut off steam, add the chrome. Boil 50 minutes and rinse.

The results, as you can readily see, are perfectly level dyeings of both the straight colors and combinations of these colors and perfect dyeing of the tips. Also, the wool was in an extremely lofty and open condition and went through the carding and spinning operations perfectly and gave this perfect fabric which, you will please note, shows no white specks and shows a very even color.

To summarize the important factors in this work, we would say—

1. It is necessary to select the correct dyestuffs.
2. It is necessary to keep the stock from packing.
3. The colors must be completely exhausted before adding the chrome.

I would like to say in closing that this method has proved satisfactory in other mills on pulled wools, mildewed wools and fine wools damaged as a result of sunlight, as well as on undamaged virgin wool, so it looks as though we killed four birds with one stone instead of the proverbial two.

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MEETING, RHODE ISLAND SECTION

THE February meeting of the Rhode Island Section was held on the 23rd at the Hall of the Providence Engineering Society; it was preceded as usual by an informal dinner at the Hotel Sheraton.

The chairman, Harold B. Sturtevant, called the meeting to order at 8:15 p.m. and, after a few announcements, introduced the speaker of the evening, Dr. Edwin R. Laughlin, Textile Color Service Division, E. I. duPont de Nemours & Co., Inc. His subject "New Developments in Textile Coloring" dealt almost entirely with the use of steam in continuous dyeing of cotton piece goods. Its greatest application to date is with the fixation of vat dyestuffs. The various details, aided by some slides, were discussed at length. Application of sulfur colors and direct colors to cotton were also mentioned and the possibilities of dyeing wool, spun rayon, and acetate fibers were also indicated. A number of dyed samples processed by the old and new methods were presented for examination.

Over 100 persons were present and they gave the speaker a rising vote of thanks at 10:45, after which the meeting adjourned.

Respectfully submitted,
R. W. Joerger, *Secretary*

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MEMBERSHIP APPLICATIONS

(Continued from Page P156)

Otto Engelhard—Sherman & Associates, Consulting & Indust. Engineers, New York City, N. Y. Sponsors: O. F. Marks, C. W. Bendigo.

Bernard Englert—Sec'y & Treas., Ferdinand Englert & Sons, Inc., New York, N. Y. Sponsors: W. H. Espelin, J. P. Bauer.

Ferdinand L. Englert—Pres., Ferdinand Englert & Sons, Inc., New York, N. Y. Sponsors: W. H. Espelin, J. P. Bauer.

Walter E. Eskew—Chemist, Southern Bleachery & Print Works, Inc., Taylors, S. C. Sponsors: E. T. Mobley, R. E. Rupp.

George P. Fulton—In charge of Research, Nat. Assoc. of Dyers & Cleaners, Silver Springs, Md. Sponsors: W. D. Appel, E. Abrams.

Emil J. Geering—Chemical Engr., General Aniline Works Div., General Aniline & Film Corp., New York 4, N. Y. Sponsors: J. R. Bonnar, H. E. Hager.

Herman B. Goldstein—Chemist, Warwick Chemical Co., West Warwick, R. I. Sponsors: L. Shapiro, R. A. Pingree.

Morris H. Goldsticker—Head Dyer, Up to Date Silk Yarn Dyeing Corp., Brooklyn, N. Y. Sponsors: F. Schlayer, L. Wolf.

Leonard W. Grant—Chemist, All-Tex Specialties Co., Apponaug, R. I. Sponsors: G. O. Linberg, M. C. Dimon.

Ferdinand Grosswirth—Plant Mgr., Jersey Dyeing Corp., East Newark, N. J. Sponsors: L. J. Dogin, W. M. Cherry.

John P. Guyer, Jr.—Sales Manager, Textile Div., S. C. Johnson & Sons, Philadelphia, Pa. Sponsor: H. C. Haller.

Frank E. Hall—Supt. of Dyeing, Maupai Dyeing Co., West New York, N. J. Sponsors: C. J. Lannaghan, M. F. Hill.

Donald G. Hambrecht—Salesman, Ciba Co., Inc., New York, N. Y.—Sponsors: W. H. Espelin, J. B. Bauer.

Neal H. Herms—Dyer, The Leaksville Woolen Mills, Inc., Charlotte, N. C. Sponsors: R. L. Ward, F. E. Sprock.

John J. Heslin—Overseer of Dyeing, Waltham Bleachery & Dye Wks., Waltham, Mass. Sponsors: W. H. Zillessen, W. W. Pennock.

Charles S. Hollingsworth—Supt., Dyeing & Finishing, Columbia Lace Co., Columbia, Pa. Sponsors: E. C. Diehl, T. H. Hart.

William H. Hughes—Asst. Prof., Chemistry & Dyeing, Philadelphia Textile Institute, Philadelphia, Pa. Sponsors: P. Theel, G. R. Decnyf, Jr.

William B. Huntley—Salesman, General Dyestuff Corp., Charlotte, N. C. Sponsors: K. A. Bridges, D. A. Barnes.

Douglas A. W. Johnson—Chemist, Dominion Silk Dyeing & Finishing Co. Ltd., Drummondville, P. Q., Canada. Sponsors: M. G. Stern, R. M. Jacoby.

Herbert G. Kessler—Dyer, Dundee Finishing Co., Passaic, N. J. Sponsors: A. Malick, J. Heintzelman.

Milton Kramer—Asst. Colorist, Normandy Print Works, New Bedford, Mass. Sponsors: J. A. Davies, F. Tripp.

Marcus Kremers—Dyer & Chemist, J. Laskin & Sons, Inc., Milwaukee, Wis. Sponsors: B. R. Medley, Jr., E. Larson.

Joseph R. Lalonde—Overseer of Warp Dyeing, Canadian Cottons, Ltd., Cornwall, Ont., Canada. Sponsors: T. H. Jackson, C. H. Young.

Fred Langford — Overseer, Bleaching, Union Bleachery, Greenville, S. C. Sponsors: E. S. Tillinghast, C. N. Rabold.

John A. Leach—Foreman Dyer, J & P. Coats (R. I.) Inc., Pawtucket, R. I. Sponsors: H. I. Bashlow, G. Jackman.

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William H. Leyking—Colorist, Nat. Aniline Div., Allied Chemical & Dye Corp.,

Buffalo, N. Y. Sponsors: T. F. Murphy, C. E. O'Connell.

John H. Longenhagen—Tech. Demonstrator, American Laboratories, Inc., Jersey City. N. J. Sponsors: W. Digrius, J. H. Ciciva.

Charles Joslin Mann — Overseer in Mixing Dept., Wanskuck Mills, Providence, R. I. Sponsors: W. M. Thornton, R. W. Joerger.

Bradley F. Marthens—Salesman, Maher Color & Chemical Co., Chicago 10, Ill. Sponsors: A. J. Olson, C. E. Maher.

Mrs. Maybelle W. McBee—Chemist, Warwick Mills, Lab. Div., Boston, Mass. Sponsors: M. A. Sieminski, G. H. Hotte.

Harold R. McCleary—Asst. Chief Chemist, Calco Chemical Div., American Cyanamid Co., Bound Brook, N. J. Sponsors: C. A. Amick, G. L. Royer.

James A. McDermott—Dyer, Kennedy & Britt, Philadelphia, Pa. Sponsors: J. E. Conaway, J. Dixon.

Herman F. Metzler—Foreman, East Knitting Mills, Royersford, Pa. Sponsors: M. M. Guertin, J. F. Rieder.

Charles Miller—Dyer,, Artloom Corp., Philadelphia, Pa. Sponsors: J. H. Culver, C. A. Hess.

Philip H. Miller—Bleacher, Slatersville Finishing Co., Slatersville, R. I. Sponsors: H. B. Sturtevant, B. A. Heslin.

Ramon Molins—Chemist, Fabrica de Hilado de Algodon "Minerva," El Salvador, Central America. Sponsors: F. Tripp, F. R. Tripp.

John A. Montchal—Dyer, B. & B. Piece Dyeworks, Inc., New York, N. Y. Sponsors: W. H. Espelin, M. G. Stern.

Matthew S. Morrison, Jr.—Textile Chemist, E. I. du Pont de Nemours & Co., Inc., Charlotte, N. C. Sponsors: J. Killheffer, J. D. Sandridge.

Edward F. Murphy—Colorist, Normandy Print Works, New Bedford, Mass. Sponsors: J. A. Davies, F. Tripp.

William P. O'Heir—Supt., Dyeing & Finishing, Shawmut Woolen Mills, Stoughton, Mass. Sponsors: H. P. Selya, J. C. Tebbets.

William A. O'Shea—Asst. in Charge of Testing, American Viscose Corp., New York, N. Y. Sponsors: T. F. O'Brien, A. R. Wachter.

Helmuth L. Pfluger—Research Chemist, Ludlow Mfg. & Sales Co., Ludlow, Mass. Sponsors: F. C. Holden, C. Conradi.

Everett C. Pittman—Head Overseer, Dyeing & Bleaching, Eagle & Phenix Mills, Columbus, Ga. Sponsors: J. M. Youngblood, W. D. Pickens.

Harold Potter—Supt. of Bleaching, Bradford Dyeing Association, Bradford, R. I. Sponsors: A. Hustwit, J. A. Pawson.

George W. Reading—Asst. Chemist, Virginia Woolen Co., Winchester, Va. Sponsors: J. Dixon, F. L. Pepper.

Louis Rioles—Supt. of Dyeing, Cooper-Kenworthy, Inc., Providence, R. I. Sponsors: P. A. Rioles, E. J. Allard.

William M. Robertson—Foreman, Sayles Finishing Plants, Inc., Saylesville, R. I. Sponsors: P. J. Ariente, H. C. Allen.

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Dudley B. Setzler—Textile Process Engineer, Quaker Chemical Products Corp., Conshohocken, Pa. Sponsors: O. G. Edwards, M. T. Barnhill.

Albert Smith—Plant Supt., Millbank, Inc., Passaic, N. J. Sponsors: J. M. Kuhn, M. Silverman.

John Stanley—Asst. Dyer, Dorlexa Dyeing & Finishing Co., Inc., Woonsocket, R. I. Sponsors: L. H. Wheeler, B. F. Rivers.

George B. Subrie—Textile Technician, Fox, Wells & Warren. Sponsors: W. B. Griffin, S. G. Davenport.

Thomas H. Swan—Research Chemist, Mellon Institute of Industrial Research, Pittsburgh, Pa. Sponsors: E. R. McLean, J. Labarthe, Jr.

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G. Adolph Thorell, Jr.—Overseer of Finishing, Fruit of the Loom, Inc., Pontiac, R. I. Sponsors: J. Wood, C. C. Adams.

John A. Tweed—Stylist, Designer, Cluett, Peabody & Co., Inc., New York, N. Y. Sponsors: L. S. Lang, H. D. Clayton.

William B. Uhler—President, Blackman-Uhler Co., Inc., Spartanburg, S. C. Sponsors: S. L. Hayes, A. R. Thompson, Jr.

Robert C. Walker—Foreman Dyer, Pawtucket Dye & Bleach Co., Pawtucket, R. I. Sponsors: R. C. Patton, F. H. Casey.

James Warr—Owner, Melrose Chemical Co., Melrose, Mass. Sponsors: A. R. Fletcher, R. W. Joerger.

Harry L. Welsted, Jr.—Textile Chemist & Colorist, National Aniline Div., Allied Chemical & Dye Corp., Charlotte, N. C. Sponsors: G. A. Artope, W. L. Barker.

William H. Weston—Professor of Biology, Harvard University, Cambridge, Mass. Sponsors: F. M. Steadman, J. E. Goodavage.

Myron Seward Whelen—Research Chemist, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Sponsors: W. M. Wentz, C. A. Seibert.

Roscoe J. Whitney—Foreman Dyer, J. & P. Coats (R. I.) Inc., Pawtucket, R. I. Sponsors: H. I. Bashlow, G. Jackman.

Walter A. Wieland—Chemical Engineer, General Aniline & Film Corp., New York, N. Y. Sponsors: J. R. Bonnar, H. E. Hager.

Richard H. Wilhelm—Associate Professor of Chemical Engineering, Princeton University, Princeton, N. J. Sponsors: G. E. Hopkins, J. S. Jacobs.

Marjorie May Wilson—Laboratory Technician, Wanskuck Co., Providence, R. I. Sponsors: W. M. Thornton, F. L. McCool.

JUNIOR

Mae E. Arbor—Control Chemist, Alrose Chemical Co., Cranston, R. I. Sponsor: E. A. Whalen.

Helene F. Forrest—Junior Dye Chemist, Aralac, Inc., New York, N. Y. Sponsors: D. G. Carmichael, C. A. Nangle.

Alfred E. Gervais—Textile Colorist, Atlantic Rayon Corp., Providence, R. I. Sponsors: J. E. Cousineau, W. S. Pride.

Gilbert E. Goheen—Chemist, General Aniline & Film Corp., New York, N. Y. Sponsors: J. R. Bonnar, H. E. Hager.

Philip J. Howard—Textile Chemist, Barbour Mills, Brockton, Mass. Sponsors: E. E. Fickett, H. C. Chapin.

James C. Jordan—Laboratory Asst., Continental Mills, Inc., Philadelphia, Pa. Sponsors: J. A. Culver, H. C. Haller.

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Edgar J. Page—Chemist, Belding Heminway Co., Putnam, Conn. Sponsors: H. C. Selya, R. W. Joerger.

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Eleanor T. Rohrback—Sr. Scientific Aide, Quartermaster Depot, Philadelphia, Pa. Sponsors: L. I. Weiner, R. Hardwood.

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F. C. Holden, C. Conradi.

Don M. Zuckerman—Asst. Supt., Anglo Fabrics Co., Oxford, Mass. Sponsors: W. E. Latham, L. G. Hayes.

ASSOCIATE

Arthur M. Frere—Salesman, Amalgamated Chemical Corp., Philadelphia, Pa.

William K. Griesinger—Research Supervisor, Atlantic Refining Co., Philadelphia, Pa.

Sol Kesslinger—Chemical Engineer, Midwest Consultants, St. Louis, Mo.

Leonard S. Manchester—Statistician, National Aniline Div., Allied Chemical & Dye Corp., Boston, Mass.

Harold S. Mitchell—Chief Chemist, Swift & Co., Chicago, Ill.

Edwin A. O'Neill—Salesman, Stein, Hall & Co., Inc., Philadelphia, Pa.

T. Richard Probst—Technical Director, Gilbert Paper Co., Menasha, Wisc.

Gertrude E. Schutze—Technical Librarian, Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

Milton F. Stancati—Licensing Officer, Chemicals, Foreign Economic Administration, Washington, D. C.

Ernest L. Taylor—Chemical Engineer, General Aniline & Film Corp., New York, N. Y.

Seth G. Twitchell—Instructor in Chemistry, High School, Concord, N. H.

Albert E. Van Wagner—Asst. to Advertising Mgr., Interchemical Corp., New York, N. Y.

J. Fred Weller—Vice Pres. & Gen. Mgr., Textile Chemicals Corp. of R. I., Providence, R. I.

STUDENT

Morton Kaplan—N. C. State College. Sponsor: A. H. Grimshaw.

John W. Merrill—Lowell Textile Institute. Sponsor: E. E. Fickett.

Dominique R. Nadeau—Bradford Durfee Textile School. Sponsor: L. B. Coombs.

Pauline F. Riordan—Lowell Textile Institute. Sponsor: E. E. Fickett.

CORPORATE

Airedale Worsted Mills.
American Bleached Goods Co.
American Velvet Co.
Armour & Co.
Aspinook Corporation.
Dow Chemical Co.
Maher Color & Chemical Co.
Meadtex Fabrics Co.
North Carolina Finishing Co.
Pfister Chemical Works, Inc.
Richmond Piece Dye Works.
Riverside & Dan River Cotton Mills.
Rock Hill Printing & Finishing Co.
Shelton Looms.
Standard Bleachery & Printing Co.
Uncas Finishing Corporation.
United Piece Dye Works.
Wellington Sears Co.
R. Wolfenden & Sons.

MEETING, NEW YORK SECTION

A meeting of the New York section was held at the Downtown Athletic Club, 19 West Street, New York City, on Friday evening, March 16th, 1945. An informal dinner preceded the meeting.

Carl Draves reported for the tellers on the results of the poll taken to determine the preferences of the members in regard to future meetings, i.e., whether they wished to have meetings held with, or without, a dinner. He stated that a total of 315 ballots were returned of which 301 were qualified. There were a total of 184 votes for a meeting with dinner and 117 for a meeting without dinner.

It was moved, seconded and carried that the vote which previously limited the cost of the dinner to members to $3.00 be rescinded.

Comdr. Walter F. Prien, chairman of the technical program committee, reported that the next meeting would be held on May 18th and that a symposium on "Corrolation of Tests Methods with Consumer End Uses" would be conducted.

The May meeting will also be the annual business meeting of the section. A nominating committee to present a slate of officers for the 1945-46 season was appointed by the chairman as follows: Comdr. Walter F. Prien, Chairman, Robert O'Hara and Daniel Knowland.

The chairman also appointed a committee as follows to survey conditions in regard to holding a summer outing: Paul J. Luck, Chairman (New Jersey), Hugo H. Todebush (Long Island) and Timothy Gibson (Westchester). This committee will report at the May meeting.

The chairman announced the appointment of the following committee chairmen: F. L. Bume, Corporate Membership Committee, and Clark Heydon, Membership Committee.

It was announced that the Intersectional Contest would be held, if possible, in connection with the December meeting of the New York Section.

The technical program consisted of a symposium on "Recent Developments in Finishing and their Applications to Fabrics." Speakers and subjects were:

Captain Joseph E. Goodavage, Philadelphia Quartermaster Depot, Philadelphia, Pa.: "Some Aspects of Finishing Marquisette with Cellulose Derivatives."

Robert R. Ackley, Fellow at the Mellon Institute of Industrial Research for the Onyx Oil & Chemical Co.: "The Softening and Lubrication of Textiles."

Alden D. Nute, Calco Chemical Division, American Cyanamid Co., Bound Brook, New Jersey: "Some Recent Aspects in the Finishing of Textile Fabrics with Melamine Resins."

The attendance was about 350.

Note: A number of photos taken at this meeting by John E. Trezise will be published in the near future.

Respectfully submitted,
NORMAN A. JOHNSON, *Secretary*

MEETING, MID-WEST SECTION

The Annual Meeting of the Mid-West Section will be held at the Bismarck Hotel, Chicago, Ill., on May 5th 1945. The following is the program:

Afternoon Session—2:00 P.M.

Dr. D. H. Powers, Monsanto Chemical Co., "New Developments in Textile Finishing." The "Information Forum" will present the following board of experts: Joseph Jones, Charles Lennox, George Chabot and Carl E. Bick. Members are requested to mail their questions to the secretary of the Mid-west Section, Louis Hoehn, Jr., at an early date.

Evening Session— 7:00 P.M.

Banquet, Report of Rumpus Committee, Business Meeting, Election of New Officers.

CALENDAR OF COMING EVENTS

Meeting, Philadelphia Section, Hotel Philadelphian, Philadelphia, Pa., April 20, 1945. Symposium on "Test Methods for Grading Light Fastness." Speakers: Capt. Stanley Backer, Philadelphia Quartermaster Depot, "Some Aspects of the Variability of Weathering Tests"; Dr. Herbert F. Launer, National Bureau of Standards, "The Standard Fading Lamp at the National Bureau of Standards and Means for Calibrating Other Lamps in Terms of It"; Charles A. Seibert, E. I. duPont de Nemours & Co., Inc., "A Proposed Method for the Calibration of Fading Lamps."

Meeting, New York Section, Downtown Athletic Club N.Y.C., May 18, 1945. Symposium on "Corrolation of Test Methods with Consumer End Uses." Annual Business Meeting.

Meeting, Northern New England Section, May 25, 1945.

Meetings, Council and Research Committee, New York City, June 22, 1945. Chairman of Sub-Committees, who wish to hold meetings on June 21, should notify Dr. Louis A. Olney.

Meeting, Rhode Island Section, Providence Engineering Society Hall, 195 Angell St., Providence, R. I., April 27, 1945. Speakers: Arthur McLean, Director of Application Laboratories, Aridye Corp., "Pigment Printing and Dyeing, Past-Present-Future"; Wallace Heintz, Organic Chemicals Dept., E. I. duPont de Nemours & Co., Inc., "New Lubricants for Oiling and Wet Finishing Woolens and Worsteds.'

OTHER ASSOCIATION MEETINGS

Meeting, Amer. Assn. of Textile Technologists, Builders' Club, New York City, May 2, 1945.

Medal Meeting, Am. Inst. of Chemists, Columbus, Ohio, May 11, 1945.

TRADE NOTES • NEW PRODUCTS

• CELANESE PATENT

A patent relating to the improvement of fastness to acid fading of dyed organic derivative of cellulose material was granted recently to Celanese Corporation of America.

According to the patent—United States Letters Patent Number 2,371,221—cellulose acetate or other organic derivative of cellulose materials dyed with water-insoluble anthraquinone dyes are treated with a solution of tannic acid and with a solution of a metal compound, such as calcium hydroxide, which reacts with the tannic acid to form a water-insoluble metal tannate.

As a result of this treatment, the fastness of the coloration to acid fumes is claimed to be greatly enhanced.

• WILMINGTON OFFERS SYNVAR RESINS

Wilmington Chemical Corporation, 10 East 40th Street, New York, N. Y., announces that it is now prepared to offer, in collaboration with the Synvar Corporation, Wilmington, Delaware, a complete line of urea formaldehyde and phenol formaldehyde resins. Present products include standard resins in liquid and powder form for a wide range of applications, as well as specially-developed products for specific end uses. Thermoplastic type resins will also be available in the near future.

• WARP MERCERIZERS GROUP

Warp mercerizers have formed a group within the Cotton-Textile Institute for the purpose of compiling statistics and conducting all activities formerly carried on by the recently disbanded Mercerizers Association of America. The promotional activities of the mercerizers will continue to be conducted by the Durene Association.

W. H. Suttenfield of the American Yarn and Processing Company presided at the initial meeting of the group which elected the following advisory committee: J. L. Thomas, Ewing-Thomas Corp.; J. S. Verlenden, Standard-Coosa-Thatcher Company and Mr. Suttenfield.

Charter members of the group include: American Yarn & Processing Co., Mt. Holly, N. C.; Dixie Mercerizing Co., Chattanooga, Tenn.; Sellers Mfg. Co., Saxaphaw, N. C.; Standard-Coosa-Thatcher Co., Chattanooga, Tennessee and Philadelphia; Southern Mercerizing Co., Tryon, Georgia; Aberfoyle Mfg. Co., Chester, Pennsylvania and Belmont, N. C.; Hampton Co., Easthampton, Massachusetts; Spinners Processing Co., Charlotte, N. C.; Ewing-Thomas Corp., Chester, Pa.; Clarence L. Myers & Co., Philadelphia, Pa.

• "KARBATE" MATERIALS IN CHEMICAL CONSTRUCTION

Calco Chemical Division of the American Cyanamid Company has made available information on its extensive utilization of "Karbate" materials, which indicates the versatility of the materials and their suitability for a variety of chemical applications. As developed by National Carbon Company, "Karbate" graphite base products are said to possess a high coefficient of heat transfer while the carbon base products are engineered for use where low heat transfer values are desired. It is stated that all "Karbate" materials are chemically inert and highly resistant to corrosion and that they are unaffected by severe thermal shock and are impregnated to make them impervious to liquids under comparatively high pressures.

Calco conducted laboratory and pilot plant tests over an extended period of time with all available chemical construction materials, such as metals, ceramics, chemical brick and "Karbate" to determine the most suitable material. On the basis of these tests, "Karbate" units were picked and trial plant installations made.

One of the first plant installations was the lining of a steel scrubber in which sodium hydroxide and sulfuric acid were used alternately to remove some of the impurities from crude organic raw materials required in the processing of dyestuffs and intermediates.

The quantity of the carbon and graphite materials makes them highly bondable. Chemically inert carbonaceous cements were used to bond the "Karbate." The unit has now been in constant service for four years and still shows no sign of scoring or deterioration.

The carbon graphite materials were utilized to cope with a chlorination problem in which refluxed vapors containing muriatic acid caused severe corrosion in the piping and condensers of the process equipment. It is stated that the new equipment remained completely free from corrosion scale formation and was unaffected by HCL at any temperature or concentration encountered.

At the present time, this equipment has been in operation for approximately five years and is said to be functioning as well today as when installed. It has neither corroded nor eroded to a detectable extent in that time. Calco engineers state that "it has been especially gratifying that there has been no measurable decrease in overall heat transfer over this period."

The Calco report on pumps stated: "Another 'headache' which has been eliminated by the use of this material was the use of 'Karbate' pumps for general utility service where filter presses are fed with various materials which may run the gamut of acid of various kinds and over a wide range of strengths to alkaline and ammoniacal filtrates. These filtrates may also vary from quite cold to boiling. 'Karbate' pumps have now been in this service for over two years with little or no maintenance and with every indication that they will go on operating for an indefinite period."

• TO HANDLE PLASTOLEIN PRODUCTS

Emery Industries, Inc. of Cincinnati, Ohio has just announced the appointment of J. D. Faiella to direct the new Plastolein Products department which has been established to handle the development and commercial application of a series of new fatty acid derivatives. Among these are the dibasic azelaic and the monobasic pelargonic acids, products new to commercial production.

In 1937, following his graduation from the University of Richmond, Virginia, Mr. Faiella began working with plastics at the Mellon Institute of Industrial Research, Pittsburgh, Pennsylvania. Since that time he has served in a technical capacity in the plastics industry. This new department therefore, will be prepared to render practical as well as laboratory assistance to problems in this field.

Postwar, the scope of this department will be broadened by the introduction of other new and unusual products some of which have had only laboratory evaluation. Currently, however, particular emphasis is being placed upon the application of these new acids, and their esters to the manufacture and modification of synthetic rubber, thermoplastics, and other resinous materials used in the production of coated fabrics, sealing compounds, aircraft insulation, protective coatings and similar applications where flexibility and permanence are of prime importance.

• ELECTED DIRECTOR

F. C. Atwood, President of Atlantic Research Associates, Inc. and of National Atlantic Research Corporation has recently been elected a Director of Clark-Babbitt Industries, Inc. of 630 Fifth Avenue, New York City.

● OPPORTUNITIES IN THE TEXTILE INDUSTRY

Opportunities for trained men and women in textile and related industries is the subject of a sixteen page pamphlet just released by the National Council of Textile School Deans. It was prepared primarily for use by the several hundred advisors connected with the fifty-two regional offices of the Veterans Administration, and for qualified veterans contemplating completion of their technical education.

The pamphlet should also be of wide interest to textile manufacturers and to others connected with the industry for it not only outlines the sort of jobs open and the types of training available to fit young people for those jobs, but it discusses briefly the broad sweep of the textile and allied industries. Further, twenty-one typical actual cases are described to illustrate the advancement made by individuals in the industry.

The pamphlet was prepared by Dr. F. M. Feiker, Educational Consultant to the Textile Foundation. It is the second publication in the series of three, the first having been an Introduction to Opportunities and Jobs in the Textile Industries and to the Training Offered by Textile Schools. Copies of the second bulletin are obtainable by application to the National Council of Textile School Deans, Edward T. Pickard, Treasurer, Kent, Connecticut.

● NEW BRANCH OFFICE

Norman E. MacCuspie, President of Prufcoat Laboratories, Inc. of Cambridge, Massachusetts, has announced the opening of a new branch office at 50 East 42nd Street, New York City and the appointment of David E. Long as General Manager in charge of sales and service-engineering. Mr. Long will make his headquarters in the New York branch office. The Prufcoat Laboratories specialize in acid-proof, alkali-proof, and waterproof protective coatings for industry, and have provided a major part of the corrosion-proofing coatings used in the new plant construction of the synthetic rubber industry.

● NYLON BOOKLET

Dyeing and Printing Nylon is the title of No. 2 of a Series of booklets on Aridye Pigment Colors for the Fabrics of Tomorrow. This booklet, which has just been issued by Aridye Corporation, Fair Lawn, N. J., describes the methods which have been developed for applying resin-bonded pigment dyes to nylon fabrics for military purposes and for postwar civilian uses. No. 1 of the series outlined the dyeing and printing of Fiberglas.

● TEXTILE-TESTING COURSE

The refresher course in Textiles and Testing Techniques held yearly in the main laboratories of the United States Testing Company, Inc., Hoboken, N. J., will be repeated this summer. These sessions are planned to bring up to date and expand theoretical textile studies. Over a period of eight years now, the course has grown to become a practical training period in textile testing. This special curriculum has proven highly successful in that it makes possible the study of laboratory techniques and testing equipment otherwise out of the reach of many.

Lecture, laboratory and demonstration periods are keyed to show the uses and values of textile testing. Current textile theory and testing procedures cover a major portion of class time. Tests made for the food, chemical, plastics and engineering and aircraft industries form a supplementary part of the agenda.

Classes will be in session from 9:00 A.M. to 4:00 P.M. beginning July 9th and extending through July 27th. A small fee is charged to cover the cost of supplies, mimeographed text and samples necessary for the student's laboratory work. The group is limited in number so they may have the advantage of individual instruction and the opportunity to work with testing equipment. Applicants are required to have some elementary textile training in order that a major portion of the three weeks may be devoted to intensified study.

Applications available from the United States Testing Company's main laboratory in Hoboken, New Jersey, will be sent on request, to representatives of the fields of education, home economics and retailing who are invited to take the course.

● GEORGE O'BRIEN RETIRES

The retirement after 50 years of service of George C. O'Brien, manager of the Naval Stores Department office in New York, was announced recently by Hercules Powder Company.

Herbert M. Wendle, of the Wilmington office, has been named to succeed Mr. O'Brien, as of April 1, 1945, according to G. F. Hogg, director of sales of the Naval Stores Department.

Mr. O'Brien, who was identified with the Laflin and Rand Powder Company and E. I. Du Pont de Nemours and Company, prior to joining Hercules, was born in Brooklyn, N. Y., in 1882.

From 1913 to 1918 Mr. O'Brien was with Hercules' Explosives Department and in 1918 he was named manager of the Chemical Sales Division. In 1923 he became identified with the Naval Stores Department and served in various capacities until his appointment as manager of the department's New York office in 1939.

● JOINS THOMPSON AND LICHTNER

Colonel Sanford E. Thompson, President of The Thompson & Lichtner Co., Inc., consulting management engineers, announced recently the appointment of Fessenden S. Blanchard as Director of Marketing. Mr. Blanchard's headquarters will be in the office of the Company's Management Division in the Park Square Building in Boston.

Mr. Blanchard leaves an association with the textile industry of many years to undertake work involving other industries as well and dealing particularly with consultation work on post-war distribution problems, including merchandising, sales management, advertising and sales promotion. For twenty-eight years he was affiliated with Pacific Mills; in 1934 he served as Deputy Administrator of Textiles of N.R.A., and in 1941 left his position of Director of Public Relations of Pacific Mills to take charge of textile conservation for W.P.B. From there he went as President to the Textile Research Institute, Inc. of New York, from which he resigned to accept the position of Director of Marketing with The Thompson & Lichtner Co., Inc.

● DYERS AND PRINTERS SCHOLARSHIP

Rayon dyers, printers and finishers have developed a plan for increasing the number of technically trained men to meet their needs through an arrangement which has been worked out with the Philadelphia Textile Institute Foundation providing graduate and undergraduate scholarships.

While the initiative in this was taken by the Silk & Rayon Printers and Dyers Association of America, the program extends to members and non-members without distinction. Basically the plan is to enable the Philadelphia Textile Institute to function more closely and effectively with the dyeing industry, not alone in the matter of scholarships, but in research.

Scholarships are to be provided for graduates of the Philadelphia Textile Institute and of other textile colleges to continue or specialize in chemistry and rayon dyeing. Scholarships would also be available to those who had completed their Junior year and had shown special aptitude or interest in chemistry and dyeing.

A still further extension of these scholarships is to graduates of properly accredited high or vocational schools who meet the entrance requirements of the Institute, so that technicians may be drawn from many parts of the country.

The plan as developed calls for contributions extending over a period of four years among the dyers. The dyers are undertaking to assess themselves $2.00 per employee annually to create the fund

to provide these scholarships and training. Already several thousand dollars have been received.

The Committee which is active in the matter consists of Edgar L. Schlesinger, of Cohn-Hall-Marx Co., Chairman of the Foundation Committee for Piece Goods Dyers; George W. Nicely, of Fontaine Converting Co., Chairman representing the industry; and Howard J. Fletcher, Executive Secretary of the Silk & Rayon Printers and Dyers Association.

This fund, when completed, will be disbursed under the supervision of a committee from the industry which will be named.

• MEETING, S.O.C.M.A.

The regular monthly luncheon-meeting of the Synthetic Organic Chemical Manufacturers Association was held on Friday, March 16th at the Midston House, New York City. A number of matters of current interest to the members were discussed. It was announced that the next meeting would be held on Friday, April 20th, at the Commodore Hotel, New York City.

• GLYCERINE ASSOCIATION PRIZES

Hobert D. Young, Diesel engineer in the Engine Laboratory of the Sinclair Refining Company, of East Chicago, is the First Prize winner in the competition instituted by the Glycerine Producers' Association for the best list of uses of glycerine, actual or recommended, not covered in the Association's booklet "Nothing Takes the Place of Glycerine—1583 Ways to Use It." He receives a $100 war bond. Four second prizes, each consisting of a $25 war bond, have been awarded to C. R. Arnold, Chemical Engineer, of New Richmond, Wisconsin, H. F. Goodenough, of the Refinery Supply Company, of Tulsa, Oklahoma, Miss Elizabeth E. Mumm, War Department Chemist, residing in Chicago, and Clement D. Vellaire, of the Upjohn Company, Kalamazoo, Michigan.

Mr. Young listed glycerine uses as a penetrating oil for Diesel engine injectors, as a lacquer and gum solvent on pistons of gasoline and Diesel engines, as a coolant for high temperature internal combustion engine operation, and for other industrial purposes.

• ENCYCLOPEDIA OF CHEMICAL TECHNOLOGY

Set up as a five year project, the first Encyclopedia of Chemical Technology, now in preparation in this country, will be designed specifically for use in the Americas, according to an announcement made recently by the co-editors, Dr. Raymond E. Kirk, head of the Department of Chemistry and Dean of the Graduate School, and Dr. Donald F. Othmer, Professor of Chemical Engineering and head of the department at the Polytechnic Institute of Brooklyn.

Miss Janet D. Scott, who for the past ten years has been a research librarian with industrial companies and who is known in the field of chemical bibliographical work, has been appointed assistant editor. She was formerly with Chemical Abstracts and the Calco Chemical Division, American Cyanamid Company. The editorial office is at the Polytechnic Institute of Brooklyn, 85 Livingston Street. To sponsor the project, a new corporation, the Interscience Encyclopedia, Inc., has been established by Interscience Publishers, Inc.

According to Dr. Kirk, there have been a few publications coming under the general heading of dictionaries, but no encyclopedia of chemical technology in the English language. When completed the new encyclopedia will be in a ten or twelve volume set, with the first volume scheduled to appear in April, 1946. The only equivalent to this new work is an already out-of-date German encyclopedia which has sold widely because of the need for such a reference book on the part of the industrial chemical engineer who is saved considerable time in a library by its use. The Encyclopedia of Chemical Technology will cover both products and processes. In the case of products, there will be a very brief description of the properties, a brief historical summary of the method of making and a clear concise account of the modern manufacturing process. Equipment of the chemical industry also will be described in considerable detail.

• LONGSTRETH MEDAL

The 1945 winner of the Longstreth Medal of The Franklin Institute will be Sanford Lockwood Cluett, according to an announcement by Dr. Henry Butler Allen, secretary and director of the Institute. Mr. Cluett will be given the award "in view of the fundamental nature and mechanical ingenuity displayed in the development of the process for the preshrinking of woven fabrics, known as Sanforizing."

The Edward Longstreth silver medal for meritorious work in science or the arts, was first given in 1899 to Harold P. Brown and Thomas A. Edison. Among later recipients are: the Welsbach Light Company, E. L. Chaffee, the Noiseless Typewriter Company, Elmer A. Sperry, Jr., and Games Slayter. Last year three Longstreth medals were awarded — to Frank B. Allen, J. Stogdell Stokes, and Edward E. Simmons, Jr.

The medal will be awarded on April 18 at the Annual Medal Day ceremonies in Philadelphia.

• PASSES 100 MARK

The Du Pont Company has passed the 100-mark in "E" awards and stars for war production. In all, 33 plants have received the "E," and a total of 70 stars have conferred.

First of the company's plants to receive government recognition of production achievement was the Carney's Point smokeless powder works, at Carney's Point, N. J., which on August 5, 1941, was given the Navy "E." This was before the award was made jointly by the Army and Navy. The plant has subsequently received five of the star awards.

Five awards have been won by the Indiana Ordnance Works, at Charlestown, Ind., the Chickasaw Ordnance Works, Millington, Tenn., and the Repauno dynamite plant at Gibbstown, N. J. An additional award went to the engineering group for the construction of Chickasaw Ordnance. Four each have been given the Neoprene Plant at Deepwater Point, N. J., the Chemical Warfare Service plant of the Electrochemicals Department at Niagara Falls, N. Y., the Barksdale high explosives plant at Barksdale, Wis., the Seaford, Del., nylon plant, the Martinsville, Va., nylon plant, the Nylon Research Laboratory near Wilmington, Del., the Pompton Lakes, N. J., explosives plant, the Morgantown, W. Va., Ordnance Works, the Oklahoma Ordnance Works, at Tulsa, the Du Pont explosives plant at Du Pont, Wash., and the Wabash River Ordnance Works at Newport, Ind., one of which was for construction.

Eight other Du Pont plants have received three awards each, five have received two each and two have received one each. Six "E's" and five stars have been awarded plants of the Remington Arms Co., a Du Pont subsidiary.

• NEW RESEARCH CORP.

The granting of a Massachusetts charter to a new corporation to be known as National Atlantic Research Corporation discloses a development important to New England, at least. Inquiry reveals that this new corporation combines the facilities and personnel of the several laboratories of National Fireworks, Inc. with those of Atlantic Research Associates, Inc., at Newtonville and Newton Center, Mass.

Atlantic Research Associates, Inc. are will known nationally for their numerous technical developments, particularly in the field of chemurgy. The public is well acquainted with the synthetic fiber, Aralac, which was developed by this group and which bears their name. Arapol is a synthetic rubber developed by Atlantic Research Associates.

The incorporators of the new company were General Daniel Needham, Charles R. Cabot, and F. C. Atwood. Mr. Atwood

heads the new company and has as vice-presidents Dr. Henry Hill, Dr. Joseph Ackerman and Mr. Edwin S. Dwelly. Lloyd K. Larson is treasurer. Directors include the above and General Daniel Needham, E. V. Babbitt, George J. J. Clark, George Lane, George J. Thomas, C. W. Wannen, H. A. Potsdam, David Black, Charles R. Cabot, and Walter Greymont.

The wide scope of activities covered by this group is indicated by their Technical Advisory Committee which consists of Dr. Hill, Dr. Ackerman, Dr. Tenney Davis, Dr. Christian Storm, Dr. Kenneth Coons, Dr. C. B. F. Young, Major C. P. T. Kaffke, Montford Morrison, Warren Thrasher, Dr. Harry Noyes and Norman Fennell with Mr. Atwood as chairman. These well known chemists and engineers have and are all contributing important developments in the several fields of explosives, textiles, rubber, fats and oils, foods, electro-chemistry and metallurgy, radar and mechanics.

● BUILDING PROGRAM APPROVED

The Institute of Textile Technology, a graduate school, chartered by the State of Virginia, announces through its President, Ward Delaney, of Charlottesville, Virginia, the approval by its Board of Trustees of its building program.

The present office and laboratory activities are housed in the 16-room residence and the 6-car garage of the permanent home to which the Institute recently moved. The location is near Farmington, 1½ miles west of Charlottesville on Highway 250. The tentative building program contemplates erection of laboratory buildings in two rows facing each other across the formal gardens behind the residence, which will then be the administration building.

The Institute Library, under this plan, will be housed in a separate building to the west and front of the administration building. Architectural symmetry will be preserved by placing the assembly hall to the front and east of the administration building.

The new buildings will be strictly functional in design, but architecturally they will harmonize with the Jeffersonian style which characterizes the University of Virginia and the Charlottesville area.

An applications building, equipped with modern textile machinery, will be erected across the lower end of the formal gardens. The two rows of laboratory buildings will be connected with the administration building at one end, and with the applications building at the other end, by a covered colonnade.

The area of the property is 15 acres. This allows ample space for a power house, machine shop, dormitory and such other buildings as may be needed. Thus opportunities are afforded for achieving efficiency in laboratory research while retaining all the beauty and academic environment appropriate to the campus of a graduate school.

The Institute is a not-for-profit corporation, owned by its members and governed by a Board of Trustees selected by the members. Its Board consists of executives prominent in the textile industry, and its growing field of service now extends from Waterville, Maine to Birmingham, Alabama.

The Institute will accept as Fellows only applicants who have their bachelor's degrees with excellent standing from recognized colleges and universities. It contemplates a course of two calendar years leading to a master's degree and four years leading to a doctor's degree in the various fields of science. Its prime functions are to train men for the textile industry and to utilize its staff in research in subjects of interest to the textile industry.

The program under which the Institute operates is divided into four essential and coordinated sections:

First, academic, under the direction of a Dean. The faculty of the academic section is composed of men from the research staff. They spend part of their time in research work and part in teaching, and no one carries a heavy teaching load. No student research is done as project work for industry.

Second, fundamental research under the direction of Dr. Joseph H. Brant, former acting research director for Tennessee-Eastman Corporation of Kingsport, Tennessee.

Third, applied research under the direction of Dr. Willard H. Bennett, formerly of Ohio State University, the Electronics Research Corporation, and latterly a major in the Air Service. This section has for one of its chief functions the application of fundamental and technical developments to commercial size textile machinery. It will carry them not only into the applications plant now being assembled by the Institute, but also into the plants of member mills.

Fourth, technical library and editing, under the direction of Dr. Julian F. Smith, Technical Librarian and Editor. This section is designed to assemble and maintain for the benefit of industry a complete technical library covering all phases of science having any application to the problems underlying the textile industry.

Two publications are maintained. One is a monthly entitled "Textile Technology Digest," which contains abstracts from current periodicals from as many points of interest throughout the world as the mails presently permit. The other is "Research Reports," a quarterly publication dedicated to an analysis and report of work done for the benefit of the membership as a whole in the laboratories of the Institute.

The principal fields of specialization which are of interest to the Institute of Textile Technology are the following: (1) Fiber microscopy. (2) Organic chemistry including fibers, natural and synthetic polymers, plastics and synthetic resins. (3) Physical chemistry, including fibrous and nonfibrous colloids and physicochemical measurements. (4) Chemical analysis. (5) Physics, including mechanics, electronics, optics, heat and thermodynamics, and physical testing. (6) Mechanical engineering, including machine design, handling materials and mill operation. (7) Chemical engineering.

In addition to research carried on for member mills, the staff of the Institute will be available to allied industry, such as suppliers of textile equipment and/or materials, for specific research on new techniques, new processes and new products which may be adapted to the textile industry. Successful results will be translated into mill development or application in member mills by the joint efforts of their technical men and the Institute staff.

● APPOINTED SALES MANAGER

The appointment of J. Angus Thurrott as sales manager of the Chicago territory for Textron, Inc., manufacturers of textile products, was announced by Royal Little, president. Mr. Thurrott succeeds Leslie J. Englis.

● APPOINTED DIRECTOR OF RESEARCH

Dr. Ralph C. Swann has been appointed director of research of American Mineral Spirits Company, according to an announcement isued by A. W. Vallentyne, vice-president. Dr. Swann received his Doctors Degree in Organic Chemistry from Massachusetts Institute of Technology and has had wide practical experience in research through his past association with several large companies in the petroleum industry. He will be located at the company's main office in Chicago.

● JOINS ATCO SALES STAFF

The Atlantic Chemical Company of Centredale, Rhode Island, recently announced the appointment of R. E. Bailey to their sales staff.

Mr. Bailey is well known throughout the New England textile trade as a practical mill man.

Formerly with the Oakes Manufacturing Company, Newbert Color Company and more recently Sales Agent of the W. C. Durfee Company, Mr. Bailey is qualified to make practical demonstrations of the various products used in dyeing and finishing all types of textile fabrics.